KEELER MOUNTAIN TIMBER SALE PROPOSAL

Draft Environmental Impact Statement

May 1, 1999

Department of Natural Resources and Conservation • Libby Unit

ABBREVIATIONS

ARM	Administrative Rules of Montana
BF	Board Feet
BMP	Best Management Practices
BMU	Bear Management Unit
CEA	Cumulative Effects Assessment
DBH	Diameter at Beast Height
DEQ	Montana Department of Environmental Quality
DF	Douglas Fir
DFWP	Montana Department of Fish, Wildlife and Parks
DNRC	Montana Department of Natural Resources and Conservation
ECA	Equivalent Clearcut Acres
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FEIS	Final Environmental Impact Statement
FI	Forest Improvement
FRTA	National Forest Roads and Trails Act
FY	Fiscal Year
GIS	Geographic Information System
H.E.	Habitat Effectiveness
HTG	Habitat Type Groups
ID Team	Interdisciplinary Team
IGBC	Interagency Grizzly Bear Committee
LPP	Lodgepole Pine
MBF	Thousand Board Feet
MMBF	Million Board Feet
MC	Mixed Conifer
NCDE	Northern Continental Divide Ecosystem (Grizzly Bear Recovery Area)
ORD	Open Road Density
ORV	Off Road Vehicle
OSHA	Office of Safety and Health Administration
PP	Ponderosa Pine
RMS	Resource Management Standard
ROD	Record of Decision
SAF	Subalpine Fir
SFLMP	State Forest Land Management Plan
SLI	Stand Level Inventory
SMZ	Streamside Management Zone
SSFI	Sale Specific Management Improvement
TAS	Timber Accounting System
TMARD	Total Motorized Access Road Density
TRD	Total Road Density
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
WL	Western Larch

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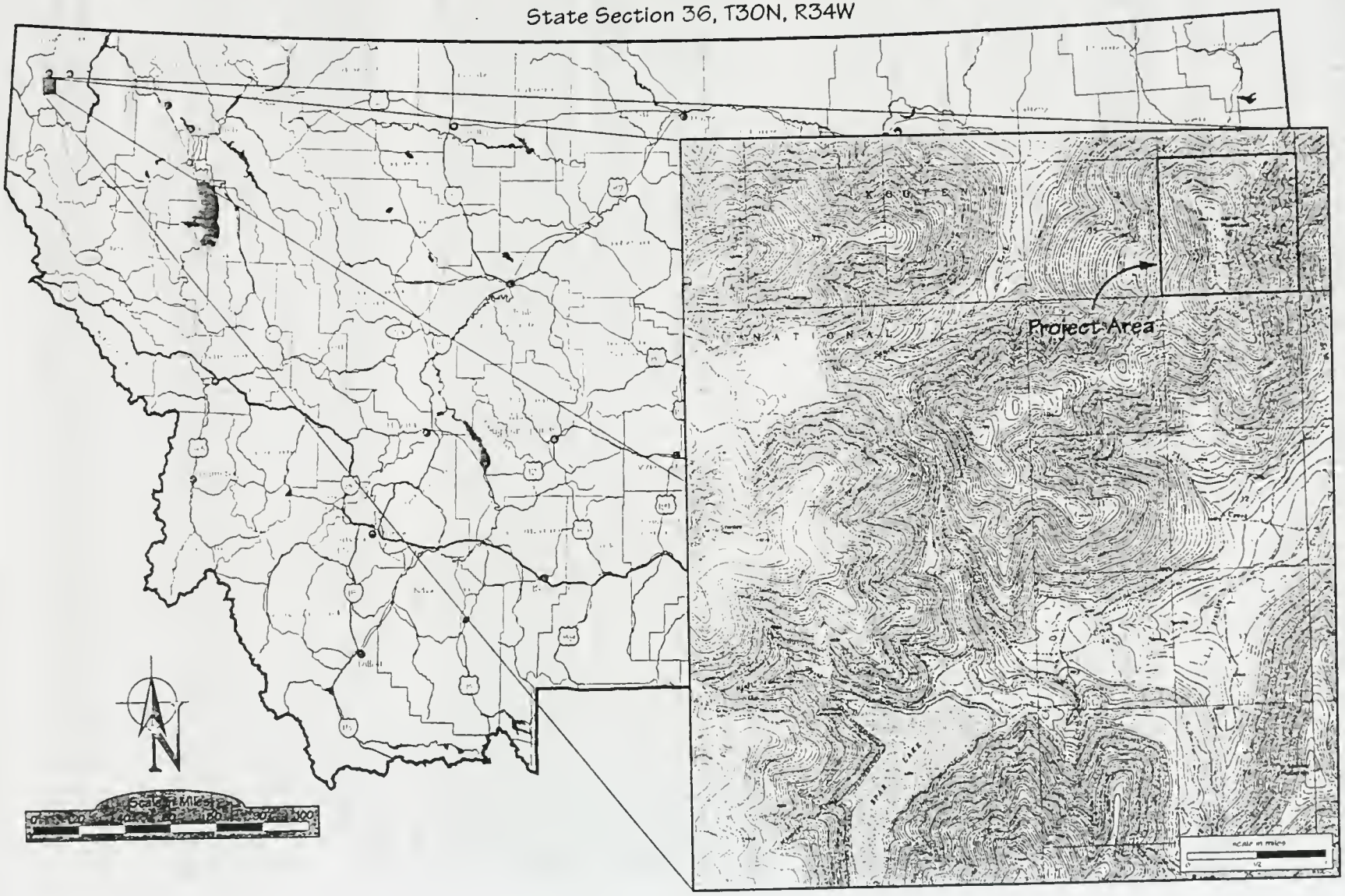
Proposed Keeler Mountain Timber Sale
General Vicinity Map
State Section 36, T30N, R34W



DRAFT ENVIRONMENTAL IMPACT STATEMENT
SUMMARY

INTRODUCTION

The Montana Department of Natural Resources and Conservation (DNRC) proposes to harvest approximately 2.4 to 6.3 million board feet of timber from State Section 36, T30N, R34W, 10 miles south of Troy, Montana. The proposed action would encompass 114-442 acres of School Trust Lands (See Figure 1-1, Vicinity Map).

If an action alternative is selected, there would be approximately 1.0 - 2.2 miles of road construction and 4.6 miles of road improvements. Existing haul roads would be improved to meet Best Management Practices (BMP) for forestry in Montana. Approximately 1.0-2.2 miles of existing low standard road would be closed to offset the new construction and maintain road density.

The proposed action would be implemented during 2000 and the anticipated completion date would be during or before 2004. Slash disposal, grass seeding, and reforestation would be accomplished by the end of 2005.

PROJECT OBJECTIVES

The lands involved in this proposed project are held by the State of Montana in trust for the support of specific beneficiary institutions such as public schools, state colleges and universities, and other specific state institutions such as the school for the deaf and blind (Enabling Act of February 22, 1889; 1972 Montana Constitution, Article X, Section 11). The Board of Land Commissioners and the Department of Trust Land(s) are required by law to administer these trust lands to produce the largest measure of reasonable and legitimate return over the long run for these beneficiary institutions (Section 77-1-202, MCA). On May 30, 1996, the Department released the Record of Decision on the State Forest Land Management Plan (the Plan or SFLMP). The Land Board approved the Plan's implementation on June 17, 1996. The Plan outlines the management philosophy of DNRC in the management of state forested trust lands, as well as sets out specific Resource Management Standards for ten resource categories. The Department will manage the lands involved in this project according to the philosophy and standards in the Plan, which states:

> *"Our premise is that the best way to produce long-term income for the trust is to manage intensively for healthy and biologically diverse forests. Our understanding is that a diverse forest is a stable forest that will produce the most reliable and highest long-term revenue stream...In the foreseeable future, timber management will continue to be our primary source of revenue and our primary tool for achieving biodiversity objectives."*

In order to meet the goals of the management philosophy adopted through programmatic review in the Plan, the Department has set the following specific project objectives:

1. To provide revenue to the Trust by harvesting 2.4 to 6.3 MMBF of timber.

2. To promote a diversity of stand structures and patterns to promote for long-term sustainability of forest resources and move forest structures toward appropriate or desired future conditions.

3. To reduce the potential for insect and disease outbreaks and the chance of a major stand replacing fire.

4. To maintain or improve vigor of commercial timber stands on treated areas.

CONNECTED AND CUMULATIVE ACTIONS

Connected actions directly tied to this project include post-harvest slash hazard reduction, tree planting, grass seeding and rehabilitation of landings. Timber harvest activities are expected to begin in 2000 and end in 2004. Slash disposal, tree planting, and rehabilitation of landings and obliteration of roads would be accomplished by 2005. Past and proposed future harvest activities and their impact on watershed yields, sedimentation, impacts to grizzly bear habitat and bull trout habitat are analyzed in relationship to this project.

RELATIONSHIP TO THE STATE FOREST LAND MANAGEMENT PLAN

In June 1996, DNRC began a phased-in implementation of the State Forest Land Management Plan (Plan). The Plan established the agency's philosophy for the management of forested state trusts lands. The management direction provided in the Plan comprises the framework within which specific project planning and activities take place.

This project was begun prior to the approval of the Resource Management standards. However, to the extent possible, the Plan philosophy and appropriate resource management standards have been incorporated into the design of the proposed action.

ENVIRONMENTAL REVIEWS RELATED TO THIS PROJECT

The Kootenai National Forest is planning management activities within the Spar Planning Unit during the period of 2000-2004. This planning unit comprises 85,000 acres surrounding DNRC's Keeler Mountain project. The USFS is very early in their planning process, as such targeted stands, management treatments and road plans have not been specifically identified. Also, no alternatives have been developed that would define a proposal in enough detail to allow completion of a quantitative cumulative effects assessment.

ENVIRONMENTAL ANALYSIS FROM ADJACENT ACTIONS THAT INFLUENCE THE PROJECT PROPOSAL

The United States Fish and Wildlife Service (USFWS) and the U.S. Forest Service (USFS) reviewed the proposed Keeler Mountain Timber Sale to assess the cumulative effects on the management of grizzly bear and their recovery within the Cabinet Yaak Ecosystem. The information that the state provided to the U.S. Fish and Wildlife service in regards to opening size, total motorized access density, habitat effectiveness, movement corridors and distance to hiding cover was preliminary planning information for the proposed actions..

The USFWS and USFS also reviewed this proposal to assess the direct, indirect and cumulative effects on the management of Bull trout and their recovery within the Keeler and Lake Creek drainages. The project was evaluated in regards to the potential effects to the species indicators and habitat indicators that are essential to Bull Trout recovery.

INVOLVEMENT OF COOPERATING AGENCIES

The biological assessment for threatened and endangered species was prepared by DNRC and USFS biologists who were in contact with the United States Fish and Wildlife Service. The Montana Department for Fish, Wildlife and Parks biologist reviewed the proposal in relation to big game and fisheries management.

PERMITS REQUIRED FOR PROJECT IMPLEMENTATION

A. U.S. Forest Service road use permit or permanent FRTA easement for roads 4610, 4602 and 384.

B. A Stream Preservation Act Permit (124 permit) is required from the Department of Fish, Wildlife and Parks for three stream crossings.

C. A short-term exemption from Montana's Surface Water Quality Standards (3A Authorization) is needed whenever temporary activities will introduce sediment above natural levels into live streams. This permit from the Montana Department of Health and Environmental Sciences is needed for some culvert installations.

D. Officially report and record individual burning in conjunction with this project as required under the Air Quality Permit issued to DNRC annually.

E. Concurrence from the USFWS on the project's impacts to Threatened and Endangered Species for activities on both USFS and State lands. USFWS concurrence is required for the state to obtain a road use permit or permanent road easement from the USFS.

PROJECT DECISIONS TO BE MADE

This EIS will provide the Decision maker with information necessary to make the following decisions.

A. Do the alternatives developed meet project objectives?

B. Which alternative should be implemented?

C. Were all practical means to avoid or minimize environmental harm adopted? If not, why not?

RESOURCE ISSUES AND CONCERNS

Initial public involvement was solicited by a newspaper advertisement in the Western News in November 1996. Letters were also sent to interested parties. Responses have been used to determine issues of concern. DNRC technical specialists (foresters, hydrologists, wildlife biologists, archeologist, forest ecologists, forest pest specialists and forest engineering specialist), Montana Department of Fish, Wildlife and Parks biologists, adjacent landowners and the public helped identify the issues that are analyzed in this EIS. A complete mailing list of those receiving notice of the project along with a record of comments received and corresponding responses can be found in the project file at the Libby Unit Office.

All timber sales designed by DNRC incorporate many routine mitigation measures, including the new SFLMP Resource Management Standards, and environmental controls to reduce impacts and answer resource concerns. Some of the other issues and concerns we received are outside the scope of the proposed action because they are either irrelevant to the decision, already decided by law or DNRC standards, beyond the geographical influence, or have nothing to do with the proposal.
Through the scoping process, concerns were raised by the public and specialists of DNRC and other agencies about the project's potential impacts on the environment. These concerns were used in developing alternatives. A summary of the comments that were incorporated into the alternatives is presented below.

1. TIMBER/VEGETATION: Timber in the proposed area is mature, overmature, or decadent. A concern was raised that the loss of timber volume tree growth and the loss of income to the trust would result if this timber were not harvested.

Concern was also expressed that past fire suppression activities have affected the incidence of tree diseases, insect infestations, biological diversity and successional processes of our forests.

2. OLD GROWTH AND BIODIVERSITY: It was voiced that the State does not adequately protect Old Growth timber stands that it manages. Concern was expressed that old growth stands should be properly verified. This verification should assess the size, distribution, and amounts of old growth within the appropriate analysis area. This data would establish a baseline to show the effects that the action alternatives have on these old growth factors.

Additional concerns arose that there should be additional mature forests available to replace old growth timber that is lost to natural succession.

3. REGENERATION: Concerns were voiced that successful regeneration must be achieved when applying even-aged harvesting methods. It was suggested that an analysis of similar land types, habitat types, slopes and aspects be evaluated for regeneration success.

4. WILDLIFE ISSUES: Concern was expressed that old-growth timber stands should be protected. Old growth habitat is critical to the survival of numerous old-growth associated species including the Boreal Owl, Black-backed Woodpecker and the Flammulated Owl.

A concern was raised that the size of the old growth stands should be sufficient to provide secure habitat for old growth associated species such as pine martin and goshawks.

A concern was raised that fragmentation of wildlife habitat both connected and cumulative to the project should be assessed in regards to its impact on wildlife.

Concern was expressed that species-specific habitat losses may occur as a result of implementing the proposed alternatives. Elk was identified as a specific management indicator species.

The possible impacts on threatened, endangered and sensitive species by the proposed alternatives was also voiced as an issue. Specifically the analysis should address the impacts on the habitat and populations of threatened, endangered and sensitive species and if the project would contribute to the extinction of any of these species. The analysis should include the current and future open road density for the appropriate analysis area and their impact on wildlife security.

5. FISHERIES: Bull trout are known to inhabit the Keeler and Stanley Creek drainages. Keeler Creek is the only known spawning tributary for the population of bull trout in Bull Lake.

Concern has been expressed that the proposed action alternatives could adversely affect native fish populations.

A concern was raised that the fisheries analysis should include a discussion of the current habitat conditions for fisheries and what the effects the action alternatives will have on their habitat conditions.

6. ROADS: Roads are a known source of sediment contribution to streams. Concerns were expressed of the direct, indirect and cumulative impacts of all road construction; reconstruction and modifications of access management.

7. WATERSHED: Much of the area surrounding the project has been impacted by past logging activities and road building. Concerns were expressed that the proposed alternatives could impact water quality, sedimentation, increase in peak flows, stream channel stability, increase stream water temperature and increase the risks associated with rain on snow events.

Concerns were also expressed that the locations of other water bodies (i.e., spring, bogs, seeps and sensitive wet areas) should be disclosed and the effects that the project activities would have on these areas should be analyzed.

Concerns were also expressed in regards to the cumulative effects of past management activities and their relationship to the present proposal.

8. SOILS AND SITE PRODUCTIVITY: Concerns were expressed that unstable land types unstable soils or erosive soils may be present in the project area. What site specific mitigations will be applied to these areas of concerns?

A concern was raised that the cumulative effects of past activities in regards to soil compaction, displacement and surface erosion should be incorporated into the effects of the proposed activities.

A question was raised that the success rate of the proposed BMP's been on similar land types.

9. NOXIOUS WEEDS: Concern was expressed that noxious weeds could be introduced into the project area and what effects could these weeds have on rare and sensitive plant populations. What specific mitigation measures will be implemented? What are the results of monitoring noxious weed infestations from past management actions.

10 VISIBILITY FOR KEELER MOUNTAIN FIRE LOOKOUT: The Keeler Mountain fire lookout tower is located on the top of Keeler Mountain and is in the middle of the project area. This lookout is staffed in the summer months with USFS personnel. Concern was expressed by the USFS that trees around the lookout are growing in height and are hindering the visibility from the lookout. The USFS would like to see the area surrounding the lookout is included in the timber sale.

11. ECONOMICS AND NET PUBLIC BENEFIT: Concerns were expressed that the selected alternatives show all costs associated with the project to show a true net profit associated with the project. All costs associated with road construction, reconstruction and road improvements, reforestation, applications of BMP's and lost recreational opportunities should be evaluated to show a true net benefit from the project. Also this analysis should adequately document who benefits from the project.

Concerns were also voiced that there should be an alternative, which utilizes the lands in the Keeler project area that will benefit local and state schools without logging or building roads.

12. AIR QUALITY AND SLASH DISPOSAL: Smoke created from burning slash was not raised as a concern, but often becomes an issue after burning takes place.

13. VISUAL QUALITY: Concern was expressed that cable yarding and road construction across the east face of Keeler Mountain would adversely affect the visual resource as seen from Highway 56 and Bull Lake.

PROJECT DEVELOPMENT

Proposals were developed to define the project in terms of the purpose of the action, laws, rules, and environmental factors. Unit location and road location were based on harvesting timber on approximately 114 to 442 acres. The proposals reflected considerations for known issues and incorporated features designed to reduce or eliminate potential adverse effects to resources. Under the direction of the decision maker, an interdisciplinary team was formed to analyze environmental effects and develop an environmental analysis. A strategy for initial scoping was then developed to provide opportunities for the public, groups and other agencies to participate in the process.

The major environmental issues identified during the scoping process were defined and are summarized. In order to understand how the proposed alternatives would change the environment a no action alternative was described to act as a baseline to compare the effects of the action alternatives.

The ID team developed timber-harvesting alternatives based on an analysis of forest stand conditions. Proposed treatments would move the forest toward desired future conditions of the landscape. Three primary concepts were used to differentiate between alternatives:

- The Mixed Conifer and Alpine fir cover types were determined to be the most over represented cover types on Libby Unit lands. Conversely the western larch/Douglas fir cover types were determined to be the most under-represented cover types. This shift in cover type representation was partially attributed to man's exclusion of fire from the environment, which allows the encroachment of shade tolerant species.
- The age class distribution on Libby Unit lands indicated that there is an over–representation of the pole (40-100 year) and mature (100-Old Growth) age classes and an under-representation of the seedling/sapling age classes.
- The old growth component part on the Keeler Mountain project was determined to be an important component of the landscape. Libby Unit lands are scattered sections spread amongst different ownership groups. Since USFS ownership surrounds the Keeler Mountain Timber Sale, the retention of old growth stands and maintaining biological corridors between the State and USFS lands would be desirable in this location.

In addition to the concepts listed above, the following criteria were used to develop the timber harvesting alternatives.

- Generate revenue for the school trusts.
- Long-term timber productivity would be maintained or enhanced.
- The natural role of wildfire in this area would be emulated by manipulating the stand structure and species composition using different silvicultural prescriptions.
- The health and vigor of the stands would be improved by reducing the density of the stands, harvesting trees that are dead or being attacked by insects or diseases, and establishing vigorous regeneration with species that grow best in full sunlight in openings created by harvesting.
- Reduce the chance of large stand replacing wildfires through the manipulation of accumulated fuels and reducing the encroachment of late successional species.

- The location of the harvest units and choice of logging systems would lessen the impacts of road construction.
- Maintain site productivity of the project area by protecting soils from compaction and displacement.
- Design harvest units and road locations to protect watersheds, water quality and fisheries habitat.
- Maintain habitat for the protection of grizzly bears.
- Provide secure habitat for big game species.
- Provide permanent access to Keeler Mountain lookout by 2 wheel drive vehicle traffic.
- Each action Alternative was developed to meet the Resource Management Standards (RMS) developed in the Plan.

STIPULATIONS AND SPECIFICATIONS

Stipulations and specifications, designed to protect natural resources during harvesting and road building activities, are incorporated into the contract clauses and timber sale administration. A list of stipulations and specifications that would be applied to any alternative in this project are an Appendix A. Mitigations designed to reduce impacts on particular natural resources are also discussed in Chapter IV.

ALTERNATIVES CONSIDERED IN DETAIL

The following alternatives are considered in detail in this analysis. This section describes a no action alternative (Alternative 1) and three action alternatives (Alternative 2, 3 and 4). The Summary of Project Actions (Table 2-1) may also help enhance alternative project descriptions. Figures 2-1, 2-2 and 2-3 are maps showing unit location within the project area for each action alternative. Table 2-3, 2-4 and 2-5 and show harvest unit size, harvest treatment and harvest equipment for each alternative.

A. ALTERNATIVE 1: This is the no action alternative. None of the proposed activities would be accomplished by this action. No timber harvesting, road reconstruction or improvements would be done.

B. ALTERNATIVE 2: This alternative would harvest approximately 2.4 MMBF of timber on 114 acres using regeneration harvest methods. Fifty three acres would be treated by a clear-cut with reserves silvicultural treatment and the remaining 61 acres would receive a seedtree with reserve treatment. Approximately one mile of new road would be built and a corresponding one mile of road would be closed or obliterated. There would be 4.6 miles of road improvement to bring the haul route up to Montana' Best Management Practices (BMP's) standards.

C. ALTERNATIVE 3: This alternative would harvest approximately 6.3 MMBF of timber on 442 acres. The same 114 acres identified under alternative 2 would be harvested using the same silvicultural treatments. In addition, 10 acres would receive a salvage treatment removing the blow down timber. Three hundred and eighteen acres would be treated using a group selection harvest method using helicopter yarding. There would be approximately 1.4 miles of new road construction with a corresponding amount of road closures and road obliteration. The 4.6 mile haul route would be brought up to BMP standards.

D. ALTERNATIVE 4: This alternative is similar to Alternative 3. The same 6.3 MMBF of timber would be harvested over the same 442 acres using the same silvicultural treatments. However, this alternative would build 2.2 miles of new roads and approximately 2.2 miles of roads would be closed or obliterated. The 4.6 mile haul route would be brought up to BMP standards. This additional road construction would reduce the 318 acres harvested by helicopter in Alternative 3 and increase the acreage treated by cable yarding and ground based systems. Because of the rugged terrain on the east half of the project area the feasibility of the cable harvesting systems is not completely known. It is estimated that between 87 and 231 acres could be logged using a combination of ground based and cable harvesting systems. The remainder of the acreage that cannot be harvested using ground based or cable methods may be harvested using a helicopter.

The economic return associated with helicopter logging appears to be uncertain; as such Alternative 4 will look at two cable harvesting options (87 acres and 231 acres) with and without helicopter logging.

Thus, Alternative 4 will be analyzed with 4 options: 1) 87 acres cable/ground harvest and 231 acres helicopter; 2) 87 acres cable/ground harvest and no helicopter logging; 3) 231 acres ground/cable harvest and 87 acre helicopter logging; and 4) 231 acre ground/cable harvest and no helicopter logging.

This range of options will be analyzed in regards to the associated impacts to soils, hydrology and economics.

TABLE S-1: SUMMARY OF PROJECT ACTIONS

PROJECTED ACTIONS	ALTERNATIVES			
	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
Acres to be logged	0	114	442	211 - 442
Acres in regeneration harvest	0	114	114	114
Acres in group selection harvest	0	0	318	87 - 318
Acres in salvage harvest	0	0	10	10
Roads: Road construction (miles) Road improvements Road closure	 0 0 0	 1.0 4.6 1.0	 1.4 4.6 1.4	 2.2 4.6 2.2
Acres retained for Old-Growth Management	63	63	63	63
Estimated Harvest Volume (MMBF)	0	2.4 MMBF	6.3 MMBF	4.3 - 6.3 MMBF
Net Return to School Trust	0	$399,651.00	$402,653.00	$538,862.00 - $776,381

COMPARISON OF ENVIRONMENTAL EFFECTS

The following table summarizes the effects of the alternatives in regard to the main resource concerns and issues identified.

RESOURCE	ALTERNATIVE 1 NO ACTION	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
FOREST CONDITIONS				
Habitat Type Group	No change in Habitat Representation			
Patch Characteristics	Patch size and shape would not change in the short term.	Patch sizes created by regeneration harvests would be smaller than historic patch sizes created by natural disturbances.		
Cover Type Representation	No short term change in cover type representation. Overtime there would be a gradual increase in mixed conifer cover types and a subsequent decrease in larch/ Douglas-fir cover types.	Approximately 114 acres of mixed conifer, alpine fir and lodgepole cover types would be converted to western larch/Douglas-fir cover types.	Approximately 165 acres of mixed conifer, alpine fir and lodgepole cover types would be converted to western larch/Douglas-fir cover types. Approximately 278 acres of western larch/Douglas-fir cover types would be treated to maintain this cover type.	
Age Class Distribution	No Action No short term change in age class distribution.	Over the short term, approximately 82 acres of 40-99 year age class would be converted to 1-39 year age class, 32 acres of 100-149 year age classes would be converted to 1-39 year age classes.		
Old Growth Representation	No old growth stands will be harvested. No change in old growth amounts in the project area or Libby Unit.			
Regeneration	Any future regeneration would be late successional tree species that will bring current forest conditions away form desired future conditions.	Survey results of similar habitat types and land types demonstrate assurance that these sites can be adequately restocked.		
Air Quality	No effect to air quality.	Increased smoke from slash burning operations would have short term negative impacts on air quality, but would not exceed the maximum allowable levels as defined by Montana Cooperative Smoke Management Plan. Increase in road dust from log hauling and heavy equipment. Dust effects are largely mitigated by the application of dust abatement.		
Sensitive Plants	No new negative impacts to sensitive plants.	Possible negative impacts to sensitive plants due to introduction of weeds. Monitoring weed populations, restricting road traffic and weed mitigation should adequately protect sensitive plants from negative impacts from possible weed introduction.		

RESOURCE	ALTERNATIVE 1 NO ACTION	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
THREATENED AND ENDANGERED SPECIES				
Peregrine Falcon	No negative impacts			
Bald Eagles	No change	No negative impacts. No change.	No negative impacts. Possible positive impacts in hunting opportunities through stand opening.	
Wolves	No change. Foraging habitat for wolves would continue to decline as conifer encroachment increase over elk and deer winter range.	Foraging habitat for wolves would continue to decline as conifer encroachment increases over elk and deer winter range. Security in project area would decrease due to increase in road density however, road closures would secure higher quality wolf habitat.	Foraging habitat for wolves may improve as elk and deer winter range is improved by timber harvest and understory burning. Road closures would secure higher quality habitat.	
Grizzly Bear	No change.	• Slight decrease in habitat effectiveness during project period. • Open road density would increase slightly in BAA however, open road density would remain under the 0.75 mi/sq. mi. in BMU. • TMARD would remain unchanged because new road closures would equal new road construction. • Security core areas would be unaltered. The percentage of the BMU would remain unchanged however, the location may be shifted by road management decisions. • Logging activities would be curtailed in the spring (April 1 to July 15) to mitigate effects to spring bear use.		
SENSITIVE SPECIES				
Flammulated Owl	No change, owl habitat would continue to degrade.		Increased habitat for flammulated owl.	
Boreal Owl	No short term change. Over long term old growth would increase and owl habitat would increase.	Slight degradation boreal to owl habitat from harvesting of Stand 5. Future salvage harvests may degrade boreal owl habitat.		
Pileated Woodpecker	Pileated woodpecker habitat would persist or improve as forests continue to develop old growth characteristics.	Increased road density in project area increases the risk that snags along road corridors will be harvested for firewood if road restrictions fail.		
			Salvaging 10 acres of blowdown timber would remove foraging opportunities for woodpeckers. Removal of shade tolerant species would reduce short term habitat but may provide long term viability to area.	
Black backed Woodpeckers	No change. Area would increase in susceptibility to stand replacement fires.	Harvest units would reduce the chance of a large stand replacing event. This situation would limit the ability of the area to develop suitable habitat for black-backed woodpeckers.		
Lynx	No change. Lynx foraging habitat would remain absent from project area. Security would remain high.	Foraging habitat would increase due to regeneration harvests. Lynx security would decrease through additional road building.		

RESOURCE	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
BIG GAME				
Moose	No change	Some calving habitat would be lost due to canopy removal, conversely foraging habitat would increase.		
Elk and Mule Deer	No change. Habitat effectiveness, and security habitat would remain high.	Habitat effectiveness would remain high. Security habitat would decline. Winter range would continue to decline.	Habitat effectiveness would remain high. Security habitat would decline. Habitat value of winter range would improve.	
Black Bears	No change. Area would provide good spring and fall foraging however, these components would decline in the absence of disturbance.	Habitat values will increase. Security in the project area will decrease however, overall security, in project vicinty would remain the same.		
FISHERIES				
Bull Trout	No change	May affect but not likely to adversely affect		
White Sturgeon	No change	No effect.		
SOILS				
Soils	No change	Minimal risks to soils or soil productivity providing recommended mitigation measures be applied.		
ROADS				
Roads	Chronic road drainage problems would persist at current levels and recover or degrade as dictated by natural and pre-existing conditions	The 4.6-mile haul route will be brought up to BMP standards. All new road construction will meet BMP standards. USFS roads will be closed and rehabilitated in equal amounts to new road construction.		
NOXIOUS WEEDS				
Noxious Weeds	No change. Noxious weeds would continue to spread or re-seed as dictated by pre-existing conditions and current management.	Minimal risk of spread of noxious weeds providing recommended mitigation's are applied.		

RESOURCE	ALTERNATIVE 1 NO ACTION	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
WATERSHED				
Water Quality	No change. No new water quality impacts would be generated. Pre-existing sediment source problems would not be repaired.	Short term increase in sediment due to culvert removals, road rehabilitation and road construction. Long term decrease in sediment by eliminating chronic sources of sediment. Minimal risk of water quality impacts from timber harvesting providing recommended mitigations are applied.		
SOCIAL AND HUMAN ISSUES				
VISIBILITY FROM KEELER MOUNTAIN LOOKOUT	Visibility from lookout will continue to degrade as trees grow in height.		Visibility from lookout will be improved because timber harvest will remove view obstructions.	
VISUAL RESOURCES	No change.	No change.	Minor impacts to visual resources providing mitigation measures are applied.	
AIR QUALITY	No change.	Short term impacts to air quality from road dust and slash burning. Impacts would not exceed standards set by Montana Smoke Cooperative Plan.		
ECONOMICS				
NET $ RETURN TO TRUST	0	$399, 651.00	$402,653.00 Helicopter logging will return $1/MBF to trust.	$538,862 - $776,381 Stumpage for group select harvesting would return $36/MBF. Using helicopter logging. Stumpage value for group selection harvest areas would increase from $36/MBF to $129/MBF by eliminating the helicopter logging. Helicopter logging appears to reduce total revenue to trust.

FIGURE S-1 PROPOSED KEELER MOUNTAIN SALE MAP—ALTERNATIVE 2

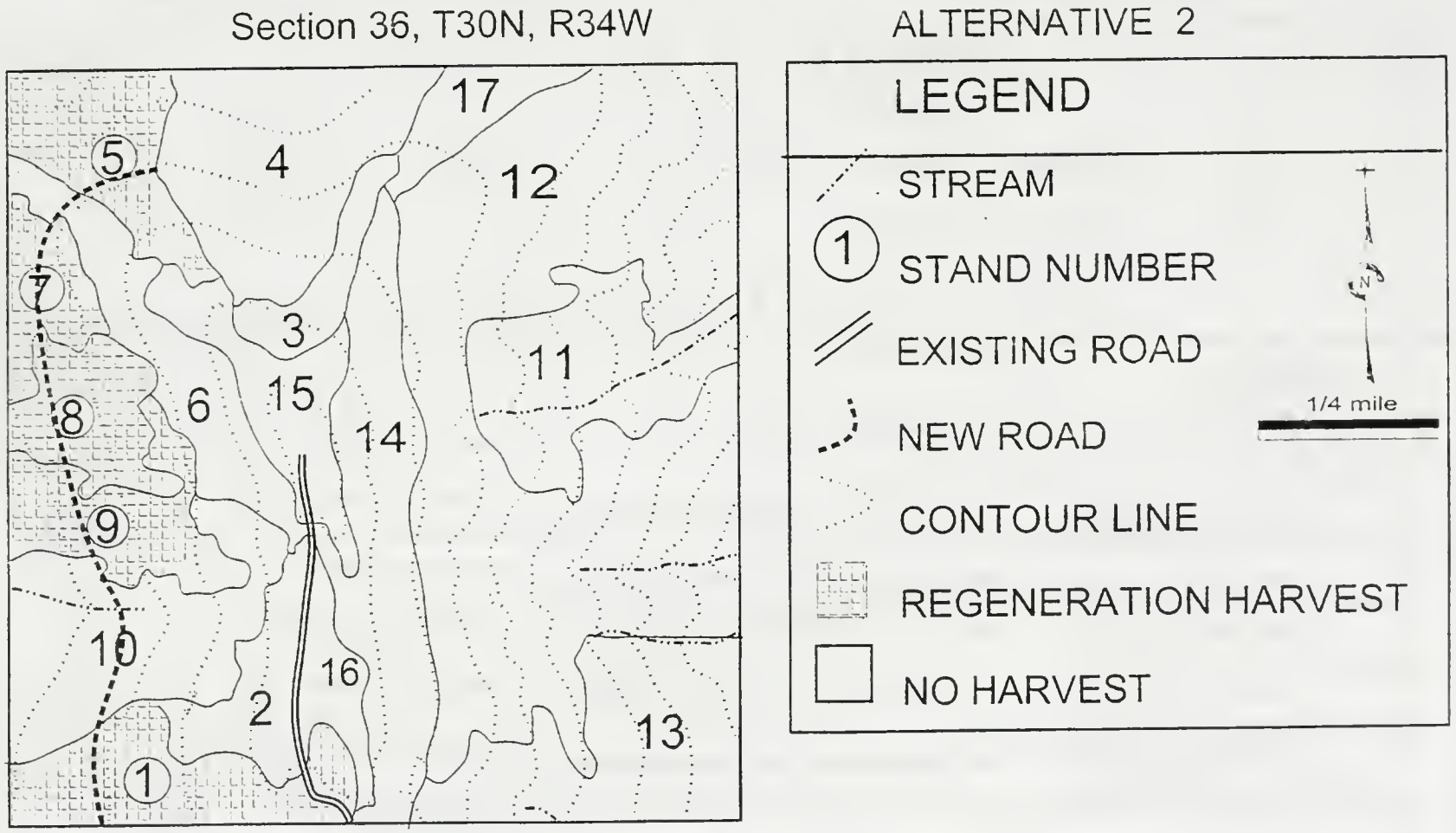


TABLE S-3: KEELER MOUNTAIN TIMBER SALE—ALTERNATIVE 2

STAND#	TREATMENT ACRES	SILVICULTURAL TREATMENT	HARVEST EQUIPMENT	PROPOSED SLASH TREATMENT
1	32	Seedtree with reserves	Line machine below road /Soft track above road	Broadcast burn below road/ excavator pile and burn above road.
5	29	Seedtree with reserves	Line machine below road /Soft track above road	Broadcast burn below road/ excavator pile and burn above road.
7	12	Clearcut with reserves	Line machine below road /Soft track above road	Broadcast burn below road/ excavator pile and burn above road.
8	21	Clearcut with reserves	Line machine below road /Soft track above road	Broadcast burn below road/ excavator pile and burn above road.
9	20	Clearcut with reserves	Line machine below road /Soft track above road	Broadcast burn below road/ excavator pile and burn above road.

Road Construction = 1.0 mile
Road Closures = 1.0 mile
Road Improvements = 4.6 miles

FIGURE S-2 PROPOSED KEELER MOUNTAIN SALE MAP—ALTERNATIVE 3

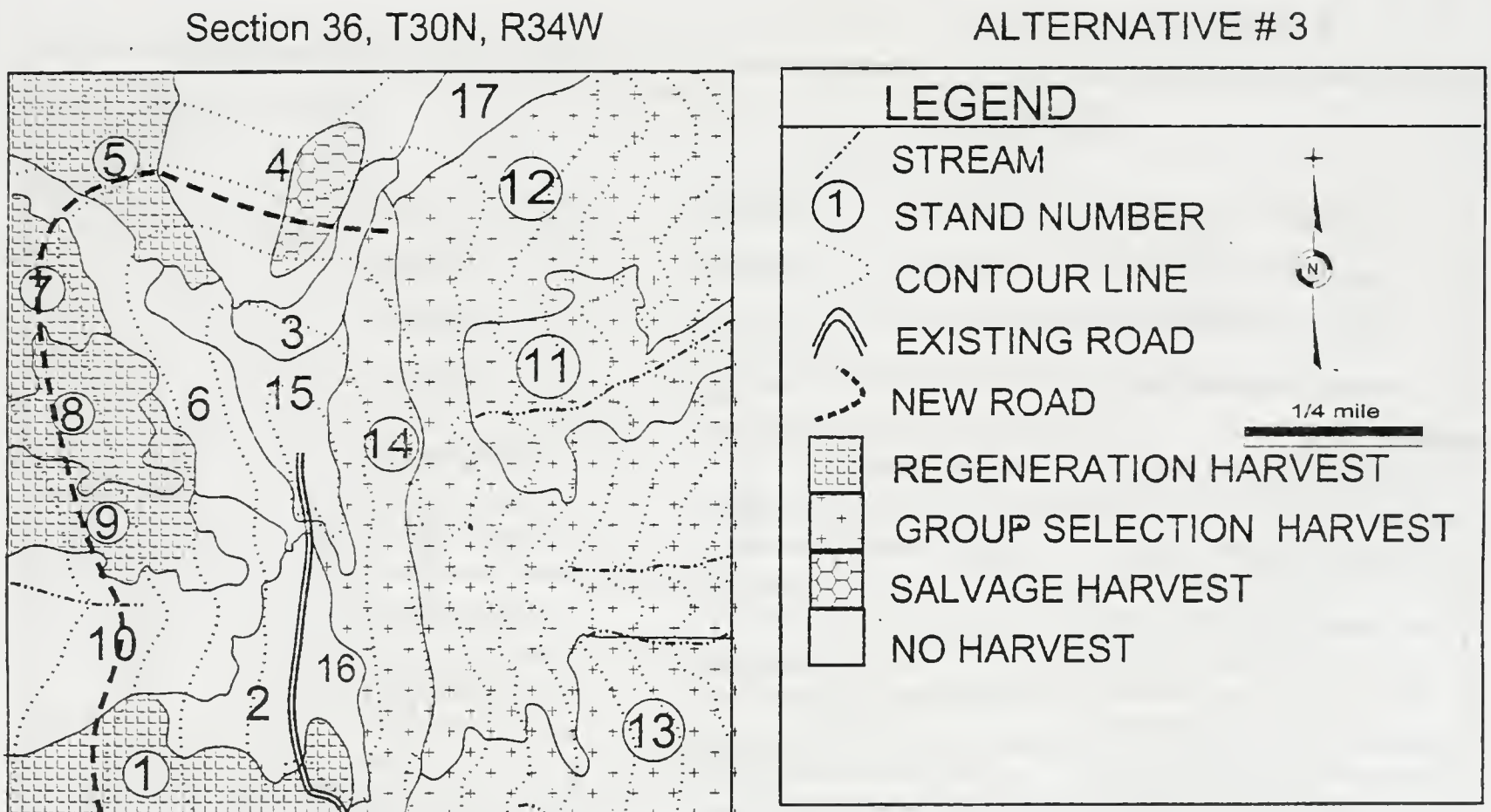


TABLE S-4: KEELER MOUNTAIN TIMBER SALE—ALTERNATIVE 3

STAND#	TREATMENT ACRES	SILVICULTURAL TREATMENT	HARVEST EQUIPMENT	PROPOSED SLASH TREATMENT
1	32	Seedtree with reserves	Line machine below road/Soft track above road	Broadcast burn below road/ excavator pile and burn above road
4	10	Salvage	Line machine below road/Soft track above road	Broadcast burn below road/ excavator pile and burn above road
5	29	Seedtree with reserves	Line machine below road/Soft track above road	Broadcast burn below road/ excavator pile and burn above road
7	12	Clearcut with reserves	Line machine below road/Soft track above road	Broadcast burn below road/ excavator pile and burn above road
8	21	Clearcut with reserves	Line machine below road/Soft track above road	Broadcast burn below road/ excavator pile and burn above road
9	20	Clearcut with reserves	Line machine below road/Soft track above road	Broadcast burn below road/ excavator pile and burn above road
11	41	Group select.	Helicopter	Jackpot burn and underburning
12	182	Group select.	Helicopter	Jackpot burn and underburning
13	47	Group select.	Helicopter	Jackpot burn and underburning
14	48	Group select.	Helicopter	Jackpot burn and underburning

Road Construction = 1.4 miles
Road Closures = 1.4 miles
Road Improvements = 4.6 miles

FIGURE S-3: PROPOSED KEELR MOUNTAIN SALE MAP —ALTERNATIVE 4

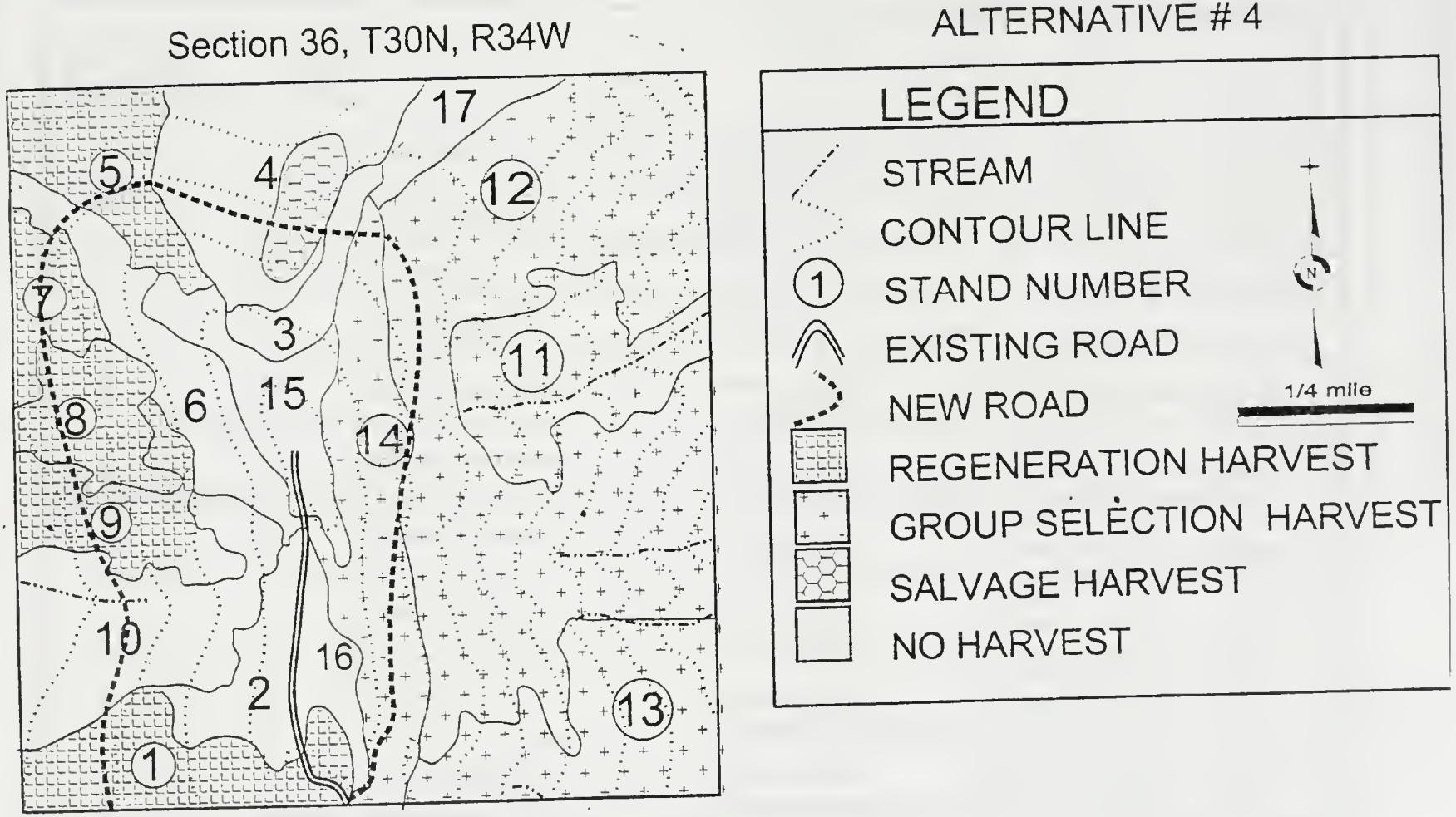


TABLE S-5: KEELER MOUNTAIN TIMBER SALE—ALTERNATIVE 4

STAND#	TREATMENT ACRES	SILVICULTURAL TREATMENT	HARVEST EQUIPMENT	PROPOSED SLASH TREATMENT
1	32	Seedtree with reserves	Line machine below road/Soft track above road	Broadcast burn below road/ excavator pile and burn above road
4	10	Salvage	Line machine below road/Soft track above road	Broadcast burn below road/ excavator pile and burn above road
5	29	Seedtree with reserves	Line machine below road/Soft track above road	Broadcast burn below road/ excavator pile and burn above road
7	12	Clearcut with reserves	Line machine below road/Soft track above road	Broadcast burn below road/ excavator pile and burn above road
8	21	Clearcut with reserves	Line machine below road/Soft track above road	Broadcast burn below road/ excavator pile and burn above road
9	20	Clearcut with reserves	Line machine below road/Soft track above road	Broadcast burn below road/ excavator pile and burn above road
11	41	Group select.	Helicopter/Line skid/Ground based	Jackpot burn and underburning
12	182	Group select.	Helicopter/Line skid/Ground based	Jackpot burn and underburning
13	47	Group select.	Helicopter/Line skid/Ground based	Jackpot burn and underburning
14	48	Group select.	Helicopter/Line skid/Ground based	Jackpot burn and underburning

Road Construction = 2.2 miles
Road Closures = 2.2 miles
Road Improvements = 4.6 miles

PROPOSED SILVICULTURAL TREATMENTS

The action alternatives use combinations of 3 silvicultural treatments. Figure 2-4 Graphical Reproduction of Silvicultural Treatments, provides a visual representation of how these treated areas may appear following harvesting. The visualizations are only a qualitative approximation of what would be expected to occur on the ground due to the variations and diversification of the stands treated in this project area. Each visualization portrays the geographical distribution of the treatment effects across a harvest unit. Keep in mind that this is a representation of the remaining distribution of trees and that 1 tree from visualization does not equate to 1 tree on the ground.

Clear-cut with reserves – This treatment is prescribed in densely stocked lodgepole pine stands. Reserve trees would include vigorous trees of varying age classes of species other than lodgepole pine and large snags. Small pockets and strips of the existing stands would be retained within the harvest units to help break up the openings and create more irregular shapes that emulate natural disturbances.

Seedtree with reserves – Large western larch, Douglas-fir, western white pine, and ponderosa pine would be retained, individually and in clumps (approximately 6-10 trees per acre), to provide a seed source, future snags, and cavity-nesting sites. Existing snags and small clumps of younger trees would also be retained to provide for both structural and species diversity.

Group selection with reserves – Small openings, up to 5 acres in size, would be created in the existing stand to promote regeneration and/or release established regeneration. Reserve trees would include vigorous trees of varying age classes in all species present. Snags and large seral trees that have a high potential to become cavity-nesting sites in the future would be retained.

FIGURE S-4: GRAPHICAL REPRODUCTION OF SILVICULTURAL TREATMENT

DRAFT EIS (DEIS)

Following scoping, DNRC prepares a DEIS, incorporating public comments relating to issues that could affect the project. Upon publication, the DEIS is circulated to interested parties; notification that it is available is sent to the parties on the mailing list that has been developed for this project. Comments are accepted for 30 days.

FINAL EIS (FEIS)

After all public comments are received and evaluated, DNRC will prepare a FEIS or adopt the DEIS as the FEIS, which consists primarily of a revision of the DEIS that incorporates new information based on public and internal comments.

NOTIFICATION OF DECISION

Following publication of the FEIS, the Unit Manager of the Libby Unit will review the information contained in the FEIS and project file, including public comment. No sooner than 15 days after publication of the FEIS, the Unit Manager will consider and determine the following:

- Do the alternatives presented in the FEIS meet the project=s purpose?
- Is the proposed mitigation adequate and feasible?
- Which alternative or combination / modification of alternatives should be implemented? Why?

These determinations will be published and all interested parties will be notified.

PROPOSED SCHEDULE OF ACTIVITIES

After a decision is published, if an action alternative is selected, several actions would be initiated. The actions initiated depend on whether the alternative is chosen in its entirety. Contract packages for two possible timber sales and proposed road construction could be prepared in 1999 and 2000.

The schedule is to present the timber sale to the State Land Board in the spring of 2000. If the Land Board approves the projects, harvesting activities and road construction would occur for approximately 1-4 years after each sale is sold. Postharvest activities, such as site preparation, planting, and hazard reduction, would occur following harvesting activities.

STIPULATIONS AND SPECIFICATIONS
KEELER MOUNTAIN TIMBER SALE

The stipulations and specifications for the action alternatives were identified or designed to prevent or reduce potential effects to resources considered in this analysis. In part, stipulations and specifications are a direct result of issue identification and resource concerns. This section is organized by resource.

Stipulations and specifications that apply to operations required by and occurring during the contract period will be contained within the Timber Sale Contract. As such, they are binding and enforceable. Stipulations and specifications relating to activities, such as hazard reduction, site preparation, and planting, that may occur during or after the contract period will be enforced by project administrators.

The following stipulations and specifications are incorporated to mitigate effects to resources involved with the action alternatives considered in this proposal.

WATERSHED AND FISHERIES

- Planned erosion-control measures include graveling portions of roads, constructing slash-filter windrows, planting grass seed, and closing and obliterating roads. Details for these control measures will be included in Appendix B of the Timber Sale Agreement.
- Streamside Management Zones (SMZs) will be delineated where they occur within or adjacent to harvest areas to protect areas adjacent to streams or lakes to maintain water quality.
- Culvert sizing for all road projects will be as recommended by DNRC hydrologist.
- Stream crossings, where culvert installations are planned, will have the following requirements, as needed, to meet Best Management Practices (BMPs) and protect water quality:

  - Slash-filter windrows will be constructed on the approach fills.
  - Filter-fabrics fences will be in place downstream prior to and during culvert installation.
  - Erosion-control fences will be installed on fill slopes at crossing sites and remain in place until the slopes stabilize and revegetate.
  - Diversion channels will be constructed and lined with plastic to divert streamflow prior to any in-channel operations.
  - Except for the equipment used to construct the crossing, stream crossing with any equipment is prohibited. The equipment used for the crossing construction will be limited to no more than 2 crossings.

- Brush will be removed from existing road prisms to allow effective road maintenance. Improved road maintenance will reduce sediment delivery.
- The contractor will be responsible for the immediate cleanup of any spills (fuel, oil, dirt, etc.) that will affect water quality.
- Fuel-leaking equipment will not be permitted to operate in stream-crossing construction sites.
- Included in the project proposal are the following pertinent recommendations of the Flathead Basin Forest Practices, Water Quality and Fisheries Cooperative Program Final Report.

The following numbers correspond to the numbering of recommendation items contained within the aforementioned document, included in pages **154** through **162** of the final report.

1) BMPs are incorporated into the project design and operations of the proposed project.

2) Riparian indicators will be considered in the harvest unit layout.

3) Management standards of the Streamside Management Zone Law (75-5-301 MCA) area used in conjunction with the recommendations of the study.

4) The BMP audit process will continue. This sale will likely be reviewed in an internal audit and may be picked at random as a Statewide audit site.

7) SMZs will be evaluated as a part of the audit process.

12) Watershed-level planning and analysis are complete. Logging plans of USFS, as reported to the Cumulative Watershed Effects Cooperative, are used.

15) DNRC will use the best methods available for logging and road building for this proposal.

17) DNRC requested inventory information from DFWP. DNRC's mitigation's plan for roads fits all recommendations for "impaired streams". Using "worst-case-scenario" criteria provides for conservative operations in this proposal.

18) Provisions in the Timber Sale Agreement address BMPs that are rigidly enforced.

29-34) DNRC has cooperated with DFWP for continuing fisheries work. DNRC will continue to monitor fisheries in the future as funding allows.

GRIZZLY BEARS

The following items are incorporated into this proposal:

- Contractors will be required to haul or store garbage in a safe place so bears will not be attracted to the area.
- The Forest Officer will immediately suspend any or all activities directly related to the proposed action, if necessary to prevent imminent confrontation or conflict between grizzly bears and humans or other threatened or endangered species and humans.
- Contractors will be prohibited, while working under contract, from carrying firearms onto closed roads.

WOLVES

A contract provision will be included to protect any wolf den or rendezvous site within the gross sale area that may be discovered during implementation of this proposal.

BIG GAME

Signs will be placed at the entrance of the Keeler Mountain area to:

inform users that the area is big game winter range,
request they not harass game animals with snowmobiles, and
request that pets are kept leashed or in direct control, so pets do not harass big game during the critical winter months.

Additional retention of existing vegetation will be done to provide security for big game in harvest units along open roads.

WILDLIFE TREES AND SNAG RETENTION AND RECRUITMENT

All existing high-quality wildlife trees/snags, such as large, broken-topped western larch, will be designated for retention and given special consideration during yarding operations to prevent loss.

Some large western larch (greater than 18" dbh) with characteristics that indicate they could become high-value snags (stem rot or physical defects) will be retained.

Clumps of larger grand fir that have stem rot will be retained to provide nesting habitat.

TOWNSEND'S BIG-EARED BAT

If any large aggregation of bats are discovered during the preparation or administration of this sale, the DNRC wildlife biologist will be informed immediately. Depending upon the nature of the report, the biologist will then coordinate efforts to determine the species. If Townsend's big-eared bats were determined to be present, further mitigative measures will be developed.

ROADS

Information on road-construction activities and road use associated with road-construction activities will be relayed to the general public.

BMPs will be incorporated in all planned road construction.

Signs will be placed at some critical intersections.

See **EROSION** section.

Under the action alternatives, many miles of existing roads will be closed by sign or physically closed; signs will also close some proposed roads. There will be a special emphasis on closing spur roads to snowmobiles by posting signs on the big game winter range.

VISUALS

Damaged residuals vegetation will be slashed.

The location, size and number of landings will be limited.

Disturbed sites along road right-of-ways will be grass seeded.

Pockets or strips of the residual stands along topographic breaks and roadsides will be retained to limit views into harvest units.

ARCHAELOLOGY

A contract clause provides for suspending operations if cultural resources are discovered; operations may only resume as directed by the Forest Officer.

A review of the project area was conducted by a DNRC archaeologist.

SOILS

COMPACTION

Logging equipment will not operate off forest roads unless soil moisture is less than 20% frozen to a depth that will support machine operations, or snow covered to a depth that will prevent compaction, rutting, or displacement.

Existing skid trails and landings will be used where their design is consistent with prescribed treatments and meets current BMP guidelines.

Designated skid trails will be required where moist soils or short steep pitches (less than 300 feet) will not be accessed by other logging systems. This will reduce the number of skid trails and the potential for erosion.

Where designated skid trails are required, timber on the trails will be felled and skidded before the remaining timber in a harvest unit is felled. This will define felling patterns, facilitate skidding on designated trails, and reduce the harvest unit area impacted by skidding equipment. Skidding plans are required to be in place prior to the start of logging operations.

Skid trail density in a harvest area will not exceed 15% of the total area.

SOIL DISPLACEMENT

To prevent displacement and erosion of topsoil, hard-track, ground-based skidding equipment will not be operated on steep slopes (greater than 40% sustained over 300 feet) unless mitigation measures assure displacement will be minimized.

Brush piling with dozers requires use of an approved brush rake.

Designated skid trails will be required in all areas where tractor yarding is proposed. Existing skid trails will be used when possible.

Lopping and scattering will be used for hazard reduction to retain woody debris onsite for nutrient cycling.

EROSION

Ground-skidding machinery will be equipped with a winchline to limit the equipment-operation areas.

Roads used by the purchaser will be reshaped and the ditches redefined following use to reduce surface erosion.

Drain dips and gravel will be installed on roads, as needed, to improve road drainage and reduce maintenance needs and erosion.

Some road sections will be repaired to upgrade the roads to design standards to reduce erosion potential and maintenance needs.

Applications of certified weed-free grass seed and fertilizer will be applied in at timely manner to all newly-constructed road surfaces and cut-and-fill slopes. Applications will also be applied to any existing disturbed cut-and-fill slopes and landings immediately adjacent to open roads. This will be done to stabilize soils and reduce or prevent noxious-weed establishment. This will include:

Seeding all road cuts and fills concurrent with construction.
Apply "quick-cover" seed mix within 1 day of work completion at wet-culvert installation sites.
Seeding all road surfaces and reseeding installation sites when the final bladding is completed for each specified road segment.

As directed by the Forest Officer, water bars, logging-slash barriers, and, in some cases, temporary culverts will be installed on skid trails where erosion is anticipated based on ground and weather conditions. These erosion-control features will be maintained and periodically inspected throughout the contract period or extension thereof.

AIR QUALITY

The first item is designed to prevent individual or cumulative effects during burning operations. The next 2 items are designed to reduce effects from burning operations.

Burning operations will be in compliance with the Montana Airshed Group reporting regulations and any burning restrictions imposed in Airshed 2. This will provide for burning during acceptable ventilation and dispersion conditions.

Dozer, landing, and roadwork debris piles will be covered to allow ignition to occur during spring when ventilation is good and surrounding fuels are wet. Covered piles are drier, ignite easier, burn hotter, and extinguish sooner due to higher relative humidity during spring. This will reduce dispersed (unentrained) smoke.

Maximize the amount of woody debris left on site. Fuels not burned do not produce smoke. If possible, larger fuels should be left and smaller fuels should be piles.

Consider other debris disposal methods for road construction and road-improvement projects, including lopping and scattering, trampling, hand piling, chipping, etc. Road right-of-way piles tend to be shaded by surrounding timber stands and do not dry out as well as piles in harvest units.

Dust abatement will be applied on the segments of roads in the Keeler Mountain Project area that are used during hauling and will benefit most from dust abatement.

An alternative disposal method for slash produced by road right-of-way, other than piling and burning, will be encourage.

NOXIOUS WEED MANAGEMENT

Surface blading to remove weeds before the seed-set stage may be required on roads affected by the proposal.

All tracked and wheeled equipment will be cleaned of noxious weeds prior to beginning project operations. The contract-administrating officer will inspect equipment periodically during project implementation.

Prompt vegetation seeding of disturbed roadside sites will be required. Roads used and closed as part of this proposal will be reshaped and seeded.

HERBICIDES

To further limit the possible spread of weeds, the following integrated weed-management mitigation measures of prevention and control will be implemented:

Road construction and skidding equipment will be cleaned of mud and weed plant parts prior to entering the site.

Disturbed roadsides and landings will be seeded with site-adapted grasses. So grass seeding will be effective, seeding will be completed concurrently with road construction.

Herbicide Application

To reduce risk to aquatic and terrestrial resources, the following will be required:

All herbicides will be applied by licensed applicators in accordance with laws, rules, and regulations of the State of Montana and Lincoln County Weed District.

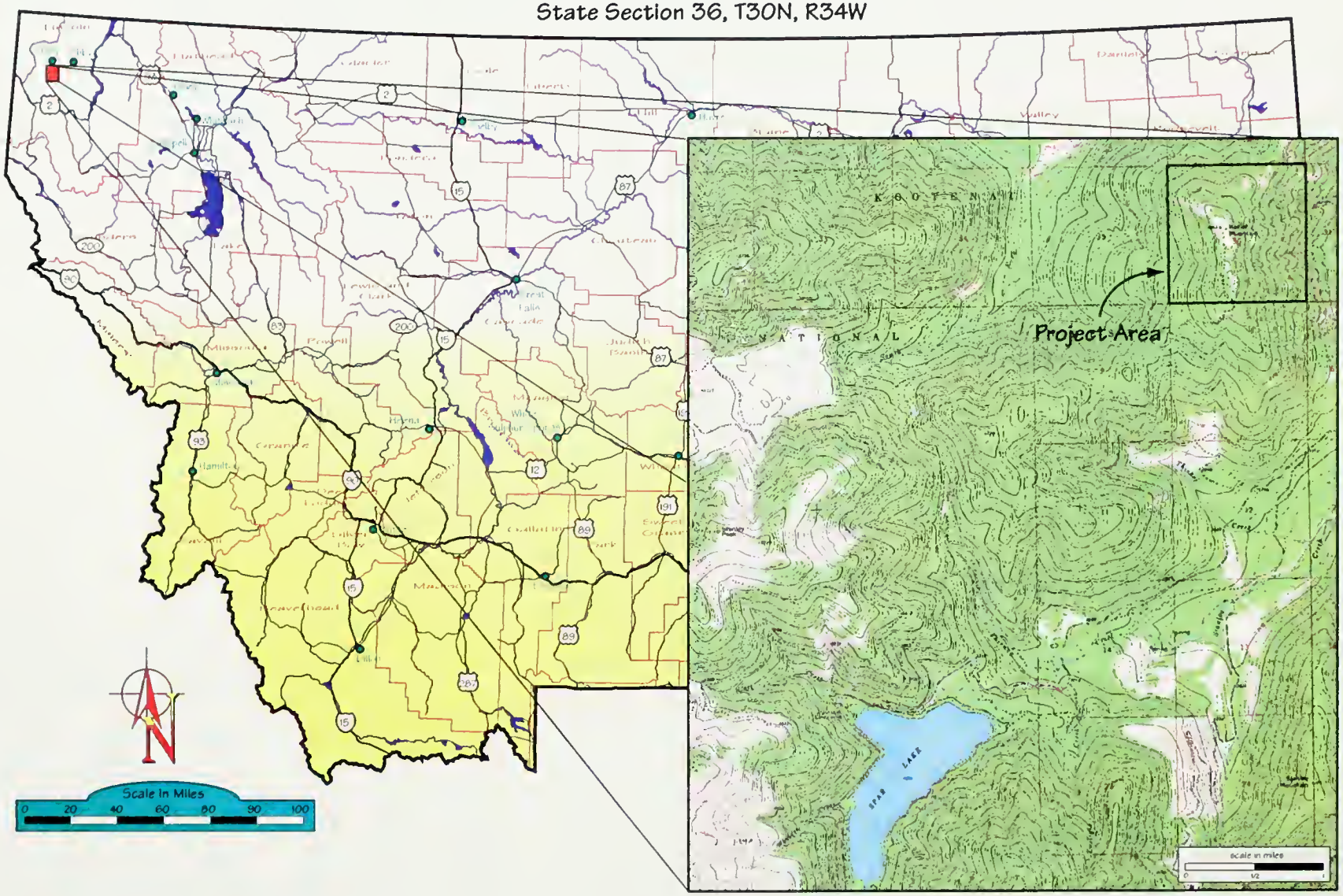
All applications will adhere to Montana's Best Management Practices and the herbicide's specific label guidelines.

Herbicide application will not be general, but site specific, to areas along roads where noxious weeds area occurring. All no-spray areas will be designated on the ground before applications begin.

Herbicides will be applied to areas where relief may contribute runoff directly into surface water.

Application will be applied on calm, dry days to limit drift and possible surface movement off road prisms.

Figure I-1
Proposed Keeler Mountain Timber Sale
General Vicinity Map
State Section 36, T30N, R34W



CHAPTER 1
PURPOSE AND NEED FOR ACTION

I. INTRODUCTION

The Montana Department of Natural Resources and Conservation (DNRC) proposes to harvest approximately 2.4 to 6.3 million board feet of timber from State Section 36, T30N, R34W, 10 miles south of Troy, Montana. The proposed action would encompass 114-442 acres of School Trust Lands (See Figure 1-1, Vicinity Map).

If an action alternative is selected, there would be approximately 1.0 - 2.2 miles of road construction and 4.6 miles of road improvements. Existing haul roads would be improved to meet Best Management Practices (BMP) for forestry in Montana. Approximately 1.0-2.2 miles of existing low standard road would be closed to offset the new construction and maintain road density.

The proposed action would be implemented during 2000 and the anticipated completion date would be during or before 2004. Slash disposal, grass seeding, and reforestation would be accomplished by the end of 2005.

II. PROJECT OBJECTIVES

The lands involved in this proposed project are held by the State of Montana in trust for the support of specific beneficiary institutions such as public schools, state colleges and universities, and other specific state institutions such as the school for the deaf and blind (Enabling Act of February 22, 1889; 1972 Montana Constitution, Article X, Section 11). The Board of Land Commissioners and the Department of Trust Land(s) are required by law to administer these trust lands to produce the largest measure of reasonable and legitimate return over the long run for these beneficiary institutions (Section 77-1-202, MCA). On May 30, 1996, the Department released the Record of Decision on the State Forest Land Management Plan (the Plan or SFLMP). The Land Board approved the Plan's implementation on June 17, 1996. The Plan outlines the management philosophy of DNRC in the management of state forested trust lands, as well as sets out specific Resource Management Standards for ten resource categories. The Department will manage the lands involved in this project according to the philosophy and standards in the Plan, which states:

> *"Our premise is that the best way to produce long-term income for the trust is to manage intensively for healthy and biologically diverse forests. Our understanding is that a diverse forest is a stable forest that will produce the most reliable and highest long-term revenue stream...In the foreseeable future, timber management will continue to be our primary source of revenue and our primary tool for achieving biodiversity objectives."*

In order to meet the goals of the management philosophy adopted through programmatic review in the Plan, the Department has set the following specific project objectives:

1. To provide revenue to the Trust by harvesting 2.4 to 6.3 MMBF of timber.

2. To promote a diversity of stand structures and patterns to promote for long-term sustainability of forest resources and move forest structures toward appropriate or desired future conditions.

3. To reduce the potential for insect and disease outbreaks and the chance of a major stand replacing fire.

4. To maintain or improve vigor of commercial timber stands on treated areas.

III. CONNECTED AND CUMULATIVE ACTIONS

Connected actions directly tied to this project include post-harvest slash hazard reduction, tree planting, grass seeding and rehabilitation of landings. Timber harvest activities are expected to begin in 2000 and end in 2004. Slash disposal, tree planting, and rehabilitation of landings and obliteration of roads would be accomplished by 2005. Past and proposed future harvest activities and their impact on watershed yields, sedimentation, impacts to grizzly bear habitat and bull trout habitat are analyzed in relationship to this project in Chapters 3 and 4.

IV. RELATIONSHIP TO THE STATE FOREST LAND MANAGEMENT PLAN

In June 1996, DNRC began a phased-in implementation of the State Forest Land Management Plan (Plan). The Plan established the agency's philosophy for the management of forested state trusts lands. The management direction provided in the Plan comprises the framework within which specific project planning and activities take place.

This project was begun prior to the approval of the Resource Management standards. However, to the extent possible, the Plan philosophy and appropriate resource management standards have been incorporated into the design of the proposed action.

V. ENVIRONMENTAL REVIEWS RELATED TO THIS PROJECT

The Kootenai National Forest is planning management activities within the Spar Planning Unit during the period of 2000-2004. This planning unit comprises 85,000 acres surrounding DNRC's Keeler Mountain project. The USFS is very early in their planning process, as such targeted stands, management treatments and road plans have not been specifically identified. Also, no alternatives have been developed that would define a proposal in enough detail to allow completion of a quantitative cumulative effects assessment.

VI. ENVIRONMENTAL ANALYSIS FROM ADJACENT ACTIONS THAT INFLUENCE THE PROJECT PROPOSAL

The United States Fish and Wildlife Service (USFWS) and the U.S. Forest Service (USFS) reviewed the proposed Keeler Mountain Timber Sale to assess the cumulative effects on the management of grizzly bear and their recovery within the Cabinet Yaak Ecosystem. The information that the state provided to the U.S. Fish and Wildlife service in regards to opening size, total motorized access density, habitat effectiveness, movement corridors and distance to hiding cover was preliminary planning information for the proposed actions..

The USFWS and USFS also reviewed this proposal to assess the direct, indirect and cumulative effects on the management of Bull trout and their recovery within the Keeler and Lake Creek drainages. The project was evaluated in regards to the potential effects to the species indicators and habitat indicators that are essential to Bull Trout recovery.

VII. INVOLVEMENT OF COOPERATING AGENCIES

The biological assessment for threatened and endangered species was prepared by DNRC and USFS biologists who were in contact with the United States Fish and Wildlife Service. The Montana Department for Fish, Wildlife and Parks biologist reviewed the proposal in relation to big game and fisheries management.

VIII. PERMITS REQUIRED FOR PROJECT IMPLEMENTATION

A. U.S. Forest Service road use permit or permanent FRTA easement for roads 4610, 4602 and 384.

B. A Stream Preservation Act Permit (124 permit) is required from the Department of Fish, Wildlife and Parks for three stream crossings.

C. A short-term exemption from Montana's Surface Water Quality Standards (3A Authorization) is needed whenever temporary activities will introduce sediment above natural levels into live streams. This permit from the Montana Department of Health and Environmental Sciences is needed for some culvert installations.

D. Officially report and record individual burning in conjunction with this project as required under the Air Quality Permit issued to DNRC annually.

E. Concurrence from the USFWS on the project's impacts to Threatened and Endangered Species for activities on both USFS and State lands. USFWS concurrence is required for the state to obtain a road use permit or permanent road easement from the USFS.

IX. PROJECT DECISIONS TO BE MADE

This EIS will provide the Decision maker with information necessary to make the following decisions.

A. Do the alternatives developed meet project objectives?

B. Which alternative should be implemented?

C. Were all practical means to avoid or minimize environmental harm adopted? If not, why not?

X. RESOURCE ISSUES AND CONCERNS

Initial public involvement was solicited by a newspaper advertisement in the Western News in November 1996. Letters were also sent to interested parties. Responses have been used to determine issues of concern. DNRC technical specialists (foresters, hydrologists, wildlife biologists, archeologist, forest ecologists, forest pest specialists and forest engineering specialist), Montana Department of Fish, Wildlife and Parks biologists, adjacent landowners and the public helped identify the issues that are analyzed in this EIS. A complete mailing list of those receiving notice of the project along with a record of comments received and corresponding responses can be found in the project file at the Libby Unit Office.

All timber sales designed by DNRC incorporate many routine mitigation measures, including the new SFLMP Resource Management Standards, and environmental controls to reduce impacts and answer resource concerns. Some of the other issues and concerns we received are outside the scope of the proposed action because they are either irrelevant to the decision, already decided by law or DNRC standards, beyond the geographical influence, or have nothing to do with the proposal.
Through the scoping process, concerns were raised by the public and specialists of DNRC and other agencies about the project's potential impacts on the environment. These concerns were used in developing alternatives (see Chapter II). A summary of the comments that were incorporated into the alternatives is presented below.

1. TIMBER/VEGETATION: Timber in the proposed area is mature, overmature, or decadent. A concern was raised that the loss of timber volume tree growth and the loss of income to the trust would result if this timber were not harvested.

Concern was also expressed that past fire suppression activities have affected the incidence of tree diseases, insect infestations, biological diversity and successional processes of our forests.

2. OLD GROWTH AND BIODIVERSITY: It was voiced that the State does not adequately protect Old Growth timber stands that it manages. Concern was expressed that old growth stands should be properly verified. This verification should assess the size, distribution, and amounts of old growth within the appropriate analysis area. This data would establish a baseline to show the effects that the action alternatives have on these old growth factors.

Additional concerns arose that there should be additional mature forests available to replace old growth timber that is lost to natural succession.

3. REGENERATION: Concerns were voiced that successful regeneration must be achieved when applying even-aged harvesting methods. It was suggested that an analysis of similar land types, habitat types, slopes and aspects be evaluated for regeneration success.

4. WILDLIFE ISSUES: Concern was expressed that old-growth timber stands should be protected. Old growth habitat is critical to the survival of numerous old-growth associated species including the Boreal Owl, Black-backed Woodpecker and the Flammulated Owl.

A concern was raised that the size of the old growth stands should be sufficient to provide secure habitat for old growth associated species such as pine martin and goshawks.

A concern was raised that fragmentation of wildlife habitat both connected and cumulative to the project should be assessed in regards to its impact on wildlife.

Concern was expressed that species-specific habitat losses may occur as a result of implementing the proposed alternatives. Elk was identified as a specific management indicator species.

The possible impacts on threatened, endangered and sensitive species by the proposed alternatives was also voiced as an issue. Specifically the analysis should address the impacts on the habitat and populations of threatened, endangered and sensitive species and if the project would contribute to the extinction of any of these species. The analysis should include the current and future open road density for the appropriate analysis area and their impact on wildlife security.

5. FISHERIES: Bull trout are known to inhabit the Keeler and Stanley Creek drainages. Keeler Creek is the only known spawning tributary for the population of bull trout in Bull Lake.

Concern has been expressed that the proposed action alternatives could adversely affect native fish populations.

A concern was raised that the fisheries analysis should include a discussion of the current habitat conditions for fisheries and what the effects the action alternatives will have on their habitat conditions.

6. ROADS: Roads are a known source of sediment contribution to streams. Concerns were expressed of the direct, indirect and cumulative impacts of all road construction; reconstruction and modifications of access management.

7. WATERSHED: Much of the area surrounding the project has been impacted by past logging activities and road building. Concerns were expressed that the proposed alternatives could impact water quality, sedimentation, increase in peak flows, stream channel stability, increase stream water temperature and increase the risks associated with rain on snow events.

Concerns were also expressed that the locations of other water bodies (i.e., spring, bogs, seeps and sensitive wet areas) should be disclosed and the effects that the project activities would have on these areas should be analyzed.

Concerns were also expressed in regards to the cumulative effects of past management activities and their relationship to the present proposal.

8. SOILS AND SITE PRODUCTIVITY: Concerns were expressed that unstable land types unstable soils or erosive soils may be present in the project area. What site specific mitigations will be applied to these areas of concerns?

A concern was raised that the cumulative effects of past activities in regards to soil compaction, displacement and surface erosion should be incorporated into the effects of the proposed activities.

A question was raised that the success rate of the proposed BMP's been on similar land types.

9. NOXIOUS WEEDS: Concern was expressed that noxious weeds could be introduced into the project area and what effects could these weeds have on rare and sensitive plant populations. What specific mitigation measures will be implemented? What are the results of monitoring noxious weed infestations from past management actions.

10 VISIBILITY FOR KEELER MOUNTAIN FIRE LOOKOUT: The Keeler Mountain fire lookout tower is located on the top of Keeler Mountain and is in the middle of the project area. This lookout is staffed in the summer months with USFS personnel. Concern was expressed by the USFS that trees around the lookout are growing in height and are hindering the visibility from the lookout. The USFS would like to see the area surrounding the lookout is included in the timber sale.

11. ECONOMICS AND NET PUBLIC BENEFIT: Concerns were expressed that the selected alternatives show all costs associated with the project to show a true net profit associated with the project. All costs associated with road construction, reconstruction and road improvements, reforestation, applications of BMP's and lost recreational opportunities should be evaluated to show a true net benefit from the project. Also this analysis should adequately document who benefits from the project.

Concerns were also voiced that there should be an alternative, which utilizes the lands in the Keeler project area that will benefit local and state schools without logging or building roads.

12. AIR QUALITY AND SLASH DISPOSAL: Smoke created from burning slash was not raised as a concern, but often becomes an issue after burning takes place.

13. VISUAL QUALITY: Concern was expressed that cable yarding and road construction across the east face of Keeler Mountain would adversely affect the visual resource as seen from Highway 56 and Bull Lake

CHAPTER 2
ALTERNATIVES

I. INTRODUCTION

This chapter briefly describes and summarizes the alternatives considered in this analysis and compares the environmental effects produced by each one. This chapter is arranged as follows:

A. PROJECT DEVELOPMENT: This section describes the development of the project and its modification through resource specialist and public review to incorporate design features and create Alternative 2, Alternative 3 and Alternative 4.

B. ALTERNATIVES CONSIDERED IN DETAIL: These include the fully developed proposals titled Alternative 1, Alternative 2, Alternative 3, and Alternative 4. Alternative 1 is a no action alternative, which serves as a baseline for environmental effects. Alternatives 2, 3 and 4 are action alternatives. No action alternatives developed by the ID team were dismissed and there is no preferred alternative at this time.

C. COMPARISON TABLE OF ENVIRONMENTAL EFFECTS OF ALTERNATIVES: This table summarizes the analysis results presented in Chapter IV. This Section, along with the discussion of environmental effects in Chapter IV, provides information needed to evaluate the alternatives.

II. PROJECT DEVELOPMENT

Proposals were developed to define the project in terms of the purpose of the action, laws, rules, and environmental factors. Unit location and road location were based on harvesting timber on approximately 114 to 442 acres. The proposals reflected considerations for known issues and incorporated features designed to reduce or eliminate potential adverse effects to resources. Under the direction of the decision maker, an interdisciplinary team was formed to analyze environmental effects and develop an environmental analysis. A strategy for initial scoping was then developed to provide opportunities for the public, groups and other agencies to participate in the process.

The major environmental issues identified during the scoping process were defined and are summarized in Chapter 1. In order to understand how the proposed alternatives would change the environment a no action alternative was described to act as a baseline to compare the effects of the action alternatives.

The ID team developed timber-harvesting alternatives based on an analysis of forest stand conditions. Proposed treatments would move the forest toward desired future conditions of the landscape. Three primary concepts were used to differentiate between alternatives:

- The Mixed Conifer and Alpine fir cover types were determined to be the most over represented cover types on Libby Unit lands. Conversely the western larch/Douglas fir cover types were determined to be the most under-represented cover types. This shift in cover type representation was partially attributed to man's exclusion of fire from the environment, which allows the encroachment of shade tolerant species.

- The age class distribution on Libby Unit lands indicated that there is an over-representation of the pole (40-100 year) and mature (100-Old Growth) age classes and an under-representation of the seedling/sapling age classes.
- The old growth component part on the Keeler Mountain project was determined to be an important component of the landscape. Libby Unit lands are scattered sections spread amongst different ownership groups. Since USFS ownership surrounds the Keeler Mountain Timber Sale, the retention of old growth stands and maintaining biological corridors between the State and USFS lands would be desirable in this location.

In addition to the concepts listed above, the following criteria were used to develop the timber harvesting alternatives.

- Generate revenue for the school trusts.
- Long-term timber productivity would be maintained or enhanced.
- The natural role of wildfire in this area would be emulated by manipulating the stand structure and species composition using different silvicultural prescriptions.
- The health and vigor of the stands would be improved by reducing the density of the stands, harvesting trees that are dead or being attacked by insects or diseases, and establishing vigorous regeneration with species that grow best in full sunlight in openings created by harvesting.
- Reduce the chance of large stand replacing wildfires through the manipulation of accumulated fuels and reducing the encroachment of late successional species.
- The location of the harvest units and choice of logging systems would lessen the impacts of road construction.
- Maintain site productivity of the project area by protecting soils from compaction and displacement.
- Design harvest units and road locations to protect watersheds, water quality and fisheries habitat.
- Maintain habitat for the protection of grizzly bears.
- Provide secure habitat for big game species.
- Provide permanent access to Keeler Mountain lookout by 2 wheel drive vehicle traffic.
- Each action Alternative was developed to meet the Resource Management Standards (RMS) developed in the Plan.

III. STIPULATIONS AND SPECIFICATIONS

Stipulations and specifications, designed to protect natural resources during harvesting and road building activities, are incorporated into the contract clauses and timber sale administration. A list of stipulations and specifications that would be applied to any alternative in this project are an Appendix A. Mitigations designed to reduce impacts on particular natural resources are also discussed in Chapter IV.

IV. ALTERNATIVES CONSIDERED IN DETAIL

The following alternatives are considered in detail in this analysis. This section describes a no action alternative (Alternative 1) and three action alternatives (Alternative 2, 3 and 4). The Summary of Project Actions (Table 2-1) may also help enhance alternative project descriptions. Figures 2-1, 2-2 and 2-3 are maps showing unit location within the project area for each action alternative. Table 2-3, 2-4 and 2-5 and show harvest unit size, harvest treatment and harvest equipment for each alternative.

A. ALTERNATIVE 1: This is the no action alternative. None of the proposed activities would be accomplished by this action. No timber harvesting, road reconstruction or improvements would be done.

B. ALTERNATIVE 2: This alternative would harvest approximately 2.4 MMBF of timber on 114 acres using regeneration harvest methods. Fifty three acres would be treated by a clear-cut with reserves silvicultural treatment and the remaining 61 acres would receive a seedtree with reserve treatment. Approximately one mile of new road would be built and a corresponding one mile of road would be closed or obliterated. There would be 4.6 miles of road improvement to bring the haul route up to Montana' Best Management Practices (BMP's) standards.

C. ALTERNATIVE 3: This alternative would harvest approximately 6.3 MMBF of timber on 442 acres. The same 114 acres identified under alternative 2 would be harvested using the same silvicultural treatments. In addition, 10 acres would receive a salvage treatment removing the blow down timber. Three hundred and eighteen acres would be treated using a group selection harvest method using helicopter yarding. There would be approximately 1.4 miles of new road construction with a corresponding amount of road closures and road obliteration. The 4.6 mile haul route would be brought up to BMP standards.

D. ALTERNATIVE 4: This alternative is similar to Alternative 3. The same 6.3 MMBF of timber would be harvested over the same 442 acres using the same silvicultural treatments. However, this alternative would build 2.2 miles of new roads and approximately 2.2 miles of roads would be closed or obliterated. The 4.6 mile haul route would be brought up to BMP standards. This additional road construction would reduce the 318 acres harvested by helicopter in Alternative 3 and increase the acreage treated by cable yarding and ground based systems. Because of the rugged terrain on the east half of the project area the feasibility of the cable harvesting systems is not completely known. It is estimated that between 87 and 231 acres could be logged using a combination of ground based and cable harvesting systems. The remainder of the acreage that cannot be harvested using ground based or cable methods may be harvested using a helicopter.

The economic return associated with helicopter logging appears to be uncertain; as such Alternative 4 will look at two cable harvesting options (87 acres and 231 acres) with and without helicopter logging.

Thus, Alternative 4 will be analyzed with 4 options: 1) 87 acres cable/ground harvest and 231 acres helicopter; 2) 87 acres cable/ground harvest and no helicopter logging; 3) 231 acres ground/cable harvest and 87 acre helicopter logging; and 4) 231 acre ground/cable harvest and no helicopter logging.

This range of options will be analyzed in regards to the associated impacts to soils, hydrology and economics.

TABLE 2-1: SUMMARY OF PROJECT ACTIONS

PROJECTED ACTIONS	ALTERNATIVES			
	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
Acres to be logged	0	114	442	211 - 442
Acres in regeneration harvest	0	114	114	114
Acres in group selection harvest	0	0	318	87 - 318
Acres in salvage harvest	0	0	10	10
Roads: Road construction (miles) Road improvements Road closure	 0 0 0	 1.0 4.6 1.0	 1.4 4.6 1.4	 2.2 4.6 2.2
Acres retained for Old-Growth Management	63	63	63	63
Estimated Harvest Volume (MMBF)	0	2.4 MMBF	6.3 MMBF	4.3 - 6.3 MMBF
Net Return to School Trust	0	$399,651.00	$402,653.00	$538,862.00 - $776,381

V. COMPARISON OF ENVIRONMENTAL EFFECTS

The following table summarizes the effects of the alternatives in regard to the main resource concerns and issues identified in Chapter 1.

RESOURCE	ALTERNATIVE 1 NO ACTION	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
FOREST CONDITIONS				
Habitat Type Group	No change in Habitat Representation			
Patch Characteristics	Patch size and shape would not change in the short term.	Patch sizes created by regeneration harvests would be smaller than historic patch sizes created by natural disturbances.		
Cover Type Representation	No short term change in cover type representation. Overtime there would be a gradual increase in mixed conifer cover types and a subsequent decrease in larch/ Douglas-fir cover types.	Approximately 114 acres of mixed conifer, alpine fir and lodgepole cover types would be converted to western larch/Douglas-fir cover types.	Approximately 165 acres of mixed conifer, alpine fir and lodgepole cover types would be converted to western larch/Douglas-fir cover types. Approximately 278 acres of western larch/Douglas-fir cover types would be treated to maintain this cover type.	
Age Class Distribution	No Action No short term change in age class distribution.	Over the short term, approximately 82 acres of 40-99 year age class would be converted to 1-39 year age class, 32 acres of 100-149 year age classes would be converted to 1-39 year age classes.		
Old Growth Representation	No old growth stands will be harvested. No change in old growth amounts in the project area or Libby Unit.			
Regeneration	Any future regeneration would be late successional tree species that will bring current forest conditions away form desired future conditions.	Survey results of similar habitat types and land types demonstrate assurance that these sites can be adequately restocked.		
Air Quality	No effect to air quality.	Increased smoke from slash burning operations would have short term negative impacts on air quality, but would not exceed the maximum allowable levels as defined by Montana Cooperative Smoke Management Plan. Increase in road dust from log hauling and heavy equipment. Dust effects are largely mitigated by the application of dust abatement.		
Sensitive Plants	No new negative impacts to sensitive plants.	Possible negative impacts to sensitive plants due to introduction of weeds. Monitoring weed populations, restricting road traffic and weed mitigation should adequately protect sensitive plants from negative impacts from possible weed introduction.		

RESOURCE	ALTERNATIVE 1 NO ACTION	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
THREATENED AND ENDANGERED SPECIES				
Peregrine Falcon	No negative impacts			
Bald Eagles	No change	No negative impacts. No change.	No negative impacts. Possible positive impacts in hunting opportunities through stand opening.	
Wolves	No change. Foraging habitat for wolves would continue to decline as conifer encroachment increase over elk and deer winter range.	Foraging habitat for wolves would continue to decline as conifer encroachment increases over elk and deer winter range. Security in project area would decrease due to increase in road density however, road closures would secure higher quality wolf habitat.	Foraging habitat for wolves may improve as elk and deer winter range is improved by timber harvest and understory burning. Road closures would secure higher quality habitat.	
Grizzly Bear	No change.	• Slight decrease in habitat effectiveness during project period. • Open road density would increase slightly in BAA however, open road density would remain under the 0.75 mi/sq. mi. in BMU. • TMARD would remain unchanged because new road closures would equal new road construction. • Security core areas would be unaltered. The percentage of the BMU would remain unchanged however, the location may be shifted by road management decisions. • Logging activities would be curtailed in the spring (April 1 to July 15) to mitigate effects to spring bear use.		
SENSITIVE SPECIES				
Flammulated Owl	No change, owl habitat would continue to degrade.		Increased habitat for flammulated owl.	
Boreal Owl	No short term change. Over long term old growth would increase and owl habitat would increase.	Slight degradation boreal to owl habitat from harvesting of Stand 5. Future salvage harvests may degrade boreal owl habitat.		
Pileated Woodpecker	Pileated woodpecker habitat would persist or improve as forests continue to develop old growth characteristics.	Increased road density in project area increases the risk that snags along road corridors will be harvested for firewood if road restrictions fail.		
			Salvaging 10 acres of blowdown timber would remove foraging opportunities for woodpeckers. Removal of shade tolerant species would reduce short term habitat but may provide long term viability to area.	
Black backed Woodpeckers	No change. Area would increase in susceptibility to stand replacement fires.	Harvest units would reduce the chance of a large stand replacing event. This situation would limit the ability of the area to develop suitable habitat for black-backed woodpeckers.		
Lynx	No change. Lynx foraging habitat would remain absent from project area. Security would remain high.	Foraging habitat would increase due to regeneration harvests. Lynx security would decrease through additional road building.		

RESOURCE	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
BIG GAME				
Moose	No change	Some calving habitat would be lost due to canopy removal, conversely foraging habitat would increase.		
Elk and Mule Deer	No change. Habitat effectiveness, and security habitat would remain high.	Habitat effectiveness would remain high. Security habitat would decline. Winter range would continue to decline.	Habitat effectiveness would remain high. Security habitat would decline. Habitat value of winter range would improve.	
Black Bears	No change. Area would provide good spring and fall foraging however, these components would decline in the absence of disturbance.	Habitat values will increase. Security in the project area will decrease however, overall security, in project vicinty would remain the same.		
FISHERIES				
Bull Trout	No change	May affect but not likely to adversely affect		
White Sturgeon	No change	No effect.		
SOILS				
Soils	No change	Minimal risks to soils or soil productivity providing recommended mitigation measures be applied.		
ROADS				
Roads	Chronic road drainage problems would persist at current levels and recover or degrade as dictated by natural and pre-existing conditions	The 4.6-mile haul route will be brought up to BMP standards. All new road construction will meet BMP standards. USFS roads will be closed and rehabilitated in equal amounts to new road construction.		
NOXIOUS WEEDS				
Noxious Weeds	No change. Noxious weeds would continue to spread or re-seed as dictated by pre-existing conditions and current management.	Minimal risk of spread of noxious weeds providing recommended mitigation's are applied.		

RESOURCE	ALTERNATIVE 1 NO ACTION	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
		WATERSHED		
Water Quality	No change. No new water quality impacts would be generated. Pre-existing sediment source problems would not be repaired.	Short term increase in sediment due to culvert removals, road rehabilitation and road construction. Long term decrease in sediment by eliminating chronic sources of sediment. Minimal risk of water quality impacts from timber harvesting providing recommended mitigations are applied.		
		SOCIAL AND HUMAN ISSUES		
VISIBILITY FROM KEELER MOUNTAIN LOOKOUT	Visibility from lookout will continue to degrade as trees grow in height.		Visibility from lookout will be improved because timber harvest will remove view obstructions.	
VISUAL RESOURCES	No change.	No change.	Minor impacts to visual resources providing mitigation measures are applied.	
AIR QUALITY	No change.	Short term impacts to air quality from road dust and slash burning. Impacts would not exceed standards set by Montana Smoke Cooperative Plan.		
		ECONOMICS		
NET $ RETURN TO TRUST	0	$399, 651.00	$402,653.00 Helicopter logging will return $1/MBF to trust.	$538,862.00 Stumpage for group select harvesting would return $36/MBF. Stumpage value for group selection harvest areas would increase from $36/MBF to $120/MBF by eliminating the helicopter logging.

FIGURE 2-1 PROPOSED KEELER MOUNTAIN SALE MAP —ALTERNATIVE 2

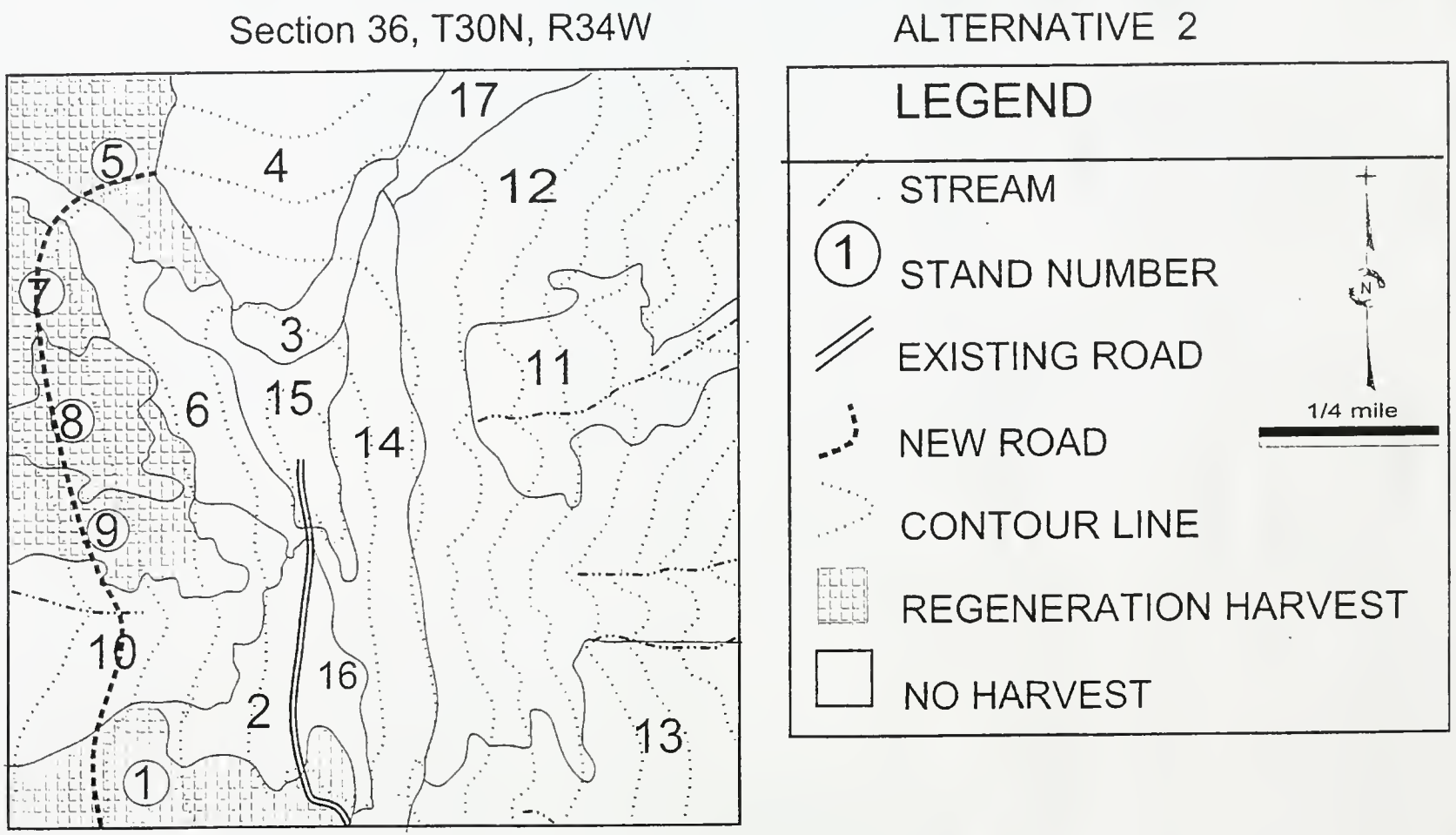


TABLE 2-3: KEELER MOUNTAIN TIMBER SALE—ALTERNATIVE 2

STAND#	TREATMENT ACRES	SILVICULTURAL TREATMENT	HARVEST EQUIPMENT	PROPOSED SLASH TREATMENT
1	32	Seedtree with reserves	Line machine below road /Soft track above road	Broadcast burn below road/ excavator pile and burn above road.
5	29	Seedtree with reserves	Line machine below road /Soft track above road	Broadcast burn below road/ excavator pile and burn above road.
7	12	Clearcut with reserves	Line machine below road /Soft track above road	Broadcast burn below road/ excavator pile and burn above road.
8	21	Clearcut with reserves	Line machine below road /Soft track above road	Broadcast burn below road/ excavator pile and burn above road.
9	20	Clearcut with reserves	Line machine below road /Soft track above road	Broadcast burn below road/ excavator pile and burn above road.
Road Construction = 1.0 mile Road Closures = 1.0 mile Road Improvements = 4.6 miles				

FIGURE 2-2 PROPOSED KEELER MOUNTAIN SALE MAP—ALTERNATIVE 3

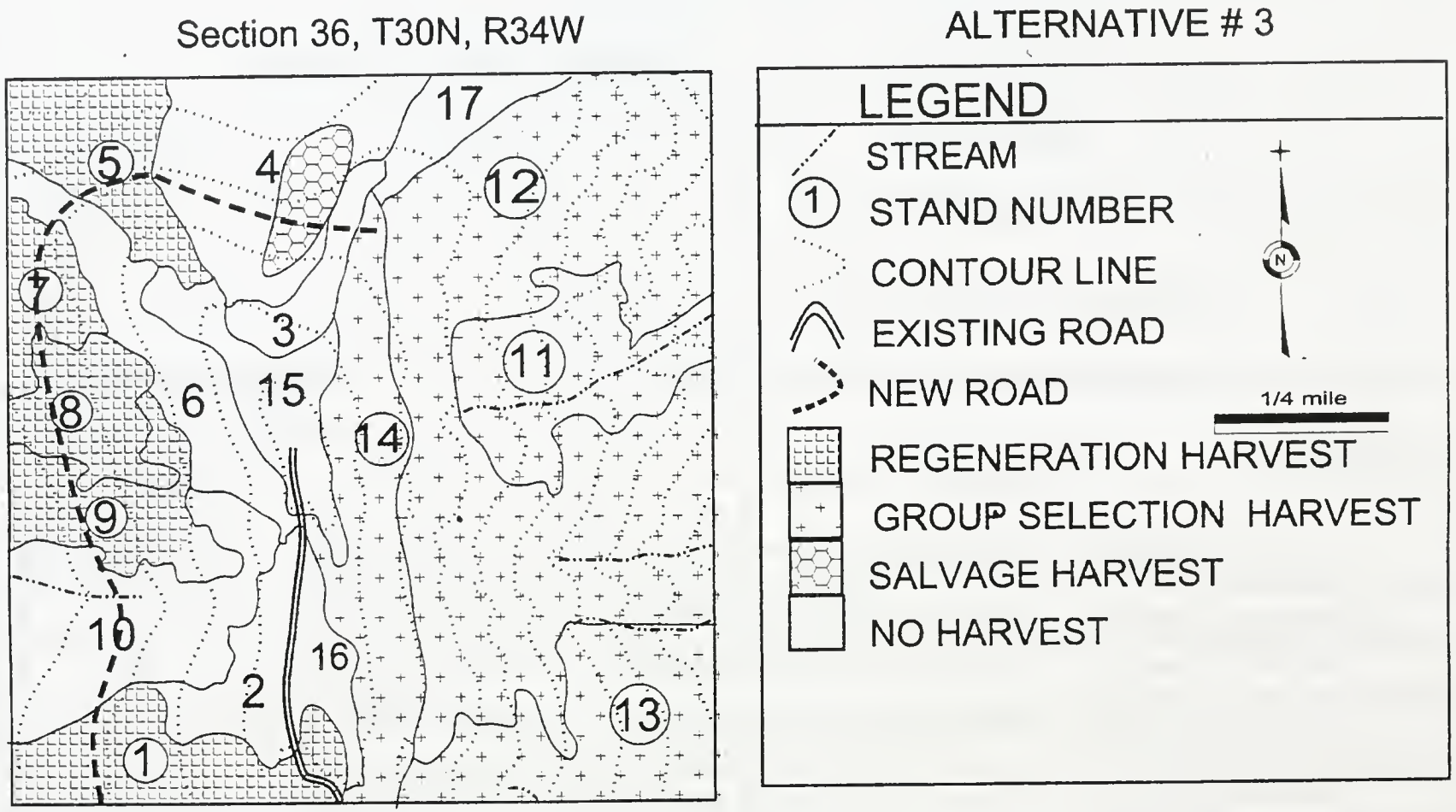


TABLE 2-4: KEELER MOUNTAIN TIMBER SALE—ALTERNATIVE 3

STAND#	TREATMENT ACRES	SILVICULTURAL TREATMENT	HARVEST EQUIPMENT	PROPOSED SLASH TREATMENT
1	32	Seedtree with reserves	Line machine below road/Soft track above road	Broadcast burn below road/ excavator pile and burn above road
4	10	Salvage	Line machine below road/Soft track above road	Broadcast burn below road/ excavator pile and burn above road
5	29	Seedtree with reserves	Line machine below road/Soft track above road	Broadcast burn below road/ excavator pile and burn above road
7	12	Clearcut with reserves	Line machine below road/Soft track above road	Broadcast burn below road/ excavator pile and burn above road
8	21	Clearcut with reserves	Line machine below road/Soft track above road	Broadcast burn below road/ excavator pile and burn above road
9	20	Clearcut with reserves	Line machine below road/Soft track above road	Broadcast burn below road/ excavator pile and burn above road
11	41	Group select.	Helicopter	Jackpot burn and underburning
12	182	Group select.	Helicopter	Jackpot burn and underburning
13	47	Group select.	Helicopter	Jackpot burn and underburning
14	48	Group select.	Helicopter	Jackpot burn and underburning

Road Construction = 1.4 miles
Road Closures = 1.4 miles
Road Improvements = 4.6 miles

FIGURE 2-3: PROPOSED KEELR MOUNTAIN SALE MAP —ALTERNATIVE 4

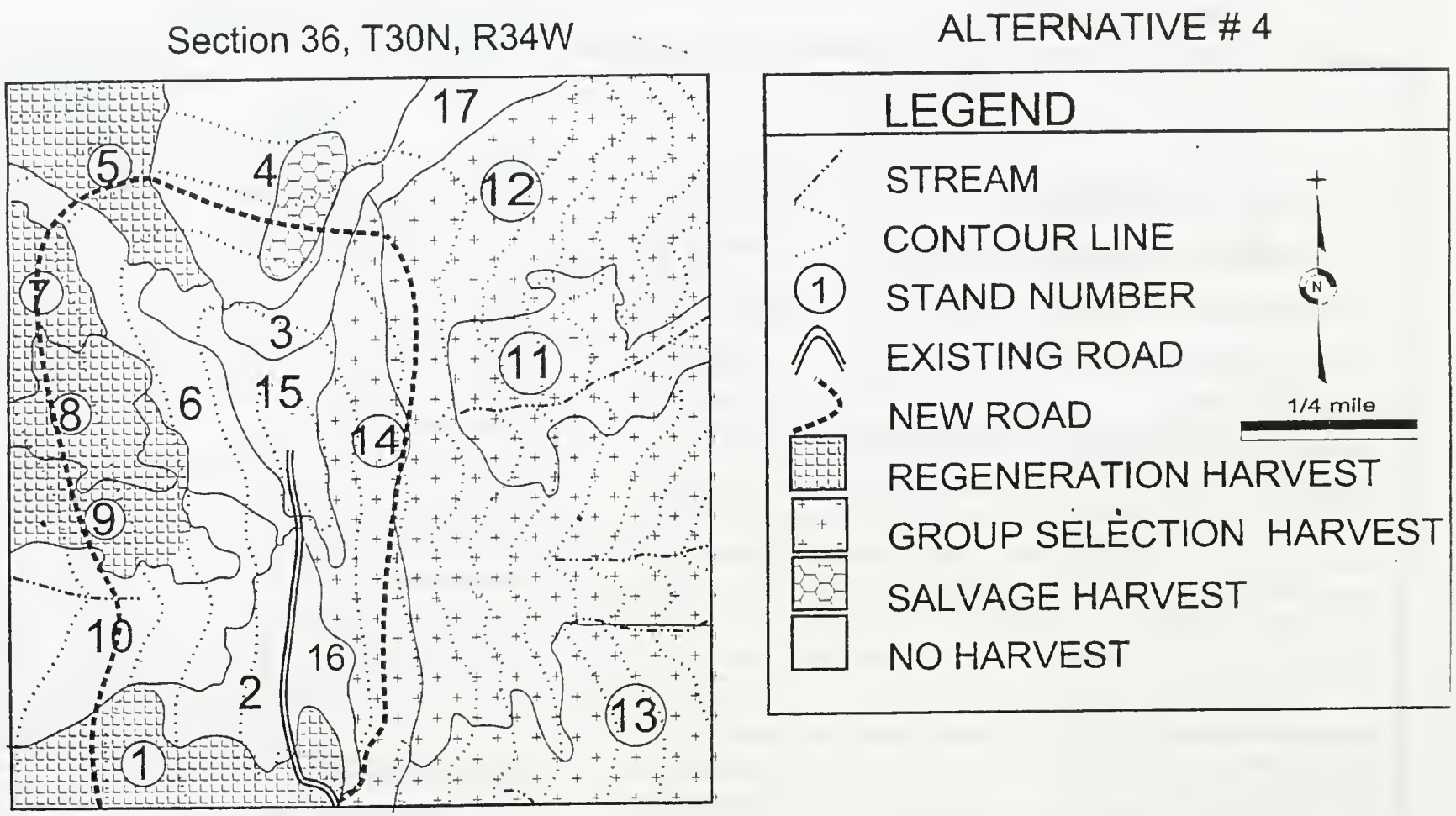


TABLE 2-5: KEELER MOUNTAIN TIMBER SALE—ALTERNATIVE 4

STAND#	TREATMENT ACRES	SILVICULTURAL TREATMENT	HARVEST EQUIPMENT	PROPOSED SLASH TREATMENT
1	32	Seedtree with reserves	Line machine below road/Soft track above road	Broadcast burn below road/ excavator pile and burn above road
4	10	Salvage	Line machine below road/Soft track above road	Broadcast burn below road/ excavator pile and burn above road
5	29	Seedtree with reserves	Line machine below road/Soft track above road	Broadcast burn below road/ excavator pile and burn above road
7	12	Clearcut with reserves	Line machine below road/Soft track above road	Broadcast burn below road/ excavator pile and burn above road
8	21	Clearcut with reserves	Line machine below road/Soft track above road	Broadcast burn below road/ excavator pile and burn above road
9	20	Clearcut with reserves	Line machine below road/Soft track above road	Broadcast burn below road/ excavator pile and burn above road
11	41	Group select.	Helicopter/Line skid/Ground based	Jackpot burn and underburning
12	182	Group select.	Helicopter/Line skid/Ground based	Jackpot burn and underburning
13	47	Group select.	Helicopter/Line skid/Ground based	Jackpot burn and underburning
14	48	Group select.	Helicopter/Line skid/Ground based	Jackpot burn and underburning

Road Construction = 2.2 miles
Road Closures = 2.2 miles
Road Improvements = 4.6 miles

VI. PROPOSED SILVICULTURAL TREATMENTS

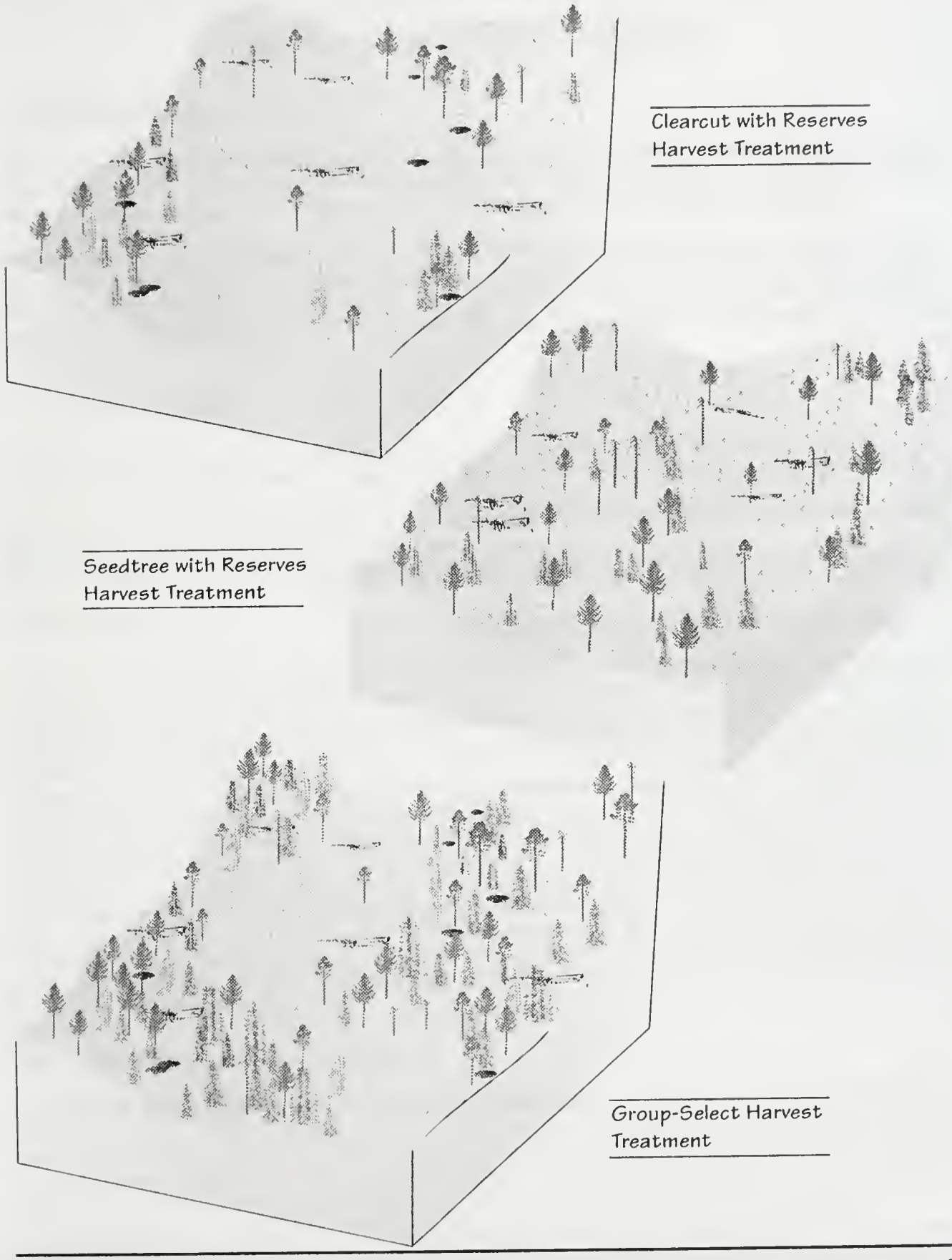
The action alternatives use combinations of 3 silvicultural treatments. Figure 2-4 Graphical Reproduction of Silvicultural Treatments, provides a visual representation of how these treated areas may appear following harvesting. The visualizations are only a qualitative approximation of what would be expected to occur on the ground due to the variations and diversification of the stands treated in this project area. Each visualization portrays the geographical distribution of the treatment effects across a harvest unit. Keep in mind that this is a representation of the remaining distribution of trees and that 1 tree from visualization does not equate to 1 tree on the ground.

Clear-cut with reserves – This treatment is prescribed in densely stocked lodgepole pine stands. Reserve trees would include vigorous trees of varying age classes of species other than lodgepole pine and large snags. Small pockets and strips of the existing stands would be retained within the harvest units to help break up the openings and create more irregular shapes that emulate natural disturbances.

Seedtree with reserves – Large western larch, Douglas-fir, western white pine, and ponderosa pine would be retained, individually and in clumps (approximately 6-10 trees per acre), to provide a seed source, future snags, and cavity-nesting sites. Existing snags and small clumps of younger trees would also be retained to provide for both structural and species diversity.

Group selection with reserves – Small openings, up to 5 acres in size, would be created in the existing stand to promote regeneration and/or release established regeneration. Reserve trees would include vigorous trees of varying age classes in all species present. Snags and large seral trees that have a high potential to become cavity-nesting sites in the future would be retained.

FIGURE 2-4: GRAPHICAL REPRODUCTION OF SILVICULTURAL TREATMENT



CHAPTER 3
AFFECTED ENVIRONMENT

I. INTRODUCTION

This chapter describes the existing environment and the current condition of those resources that drove the development of alternatives and would be affected by the proposed action. The description of the existing environment serves as a baseline for the effects comparison presented in Chapter IV.

For the purposes of this discussion the analysis area is the primary project area (Sec. 36, T30N, R34W) and where appropriate, Libby Unit lands and the surrounding Kootenai National Forest lands. The size of the analysis areas varies among resources depending on the requirements of the resource being analyzed and the methods used for the analysis. The cumulative effects of past activities are discussed in this chapter.

II. PROJECT AREA

The Keeler Mountain project vicinity lies within two watersheds, Keeler Creek to the west and Lake Creek to the east. Both of these watersheds flow north and contribute to the Kootenai River drainage.

The area has a favorable climate and good site conditions for forest vegetation. The climate is strongly influenced by rain-on-snow events. Average annual precipitation ranges from 29 to 108 inches. At the higher elevations, most precipitation falls as snow.

Fire History

Wildfire historically played a role by interrupting forest succession and creating much of the vegetative diversity that is apparent. The Lake Creek valley is a combination of open-grown ponderosa pine, Douglas-fir, multistoried western larch/Douglas-fir, dense stands of western red cedar and western hemlock with pockets of lodgepole pine. The open grown stands on the lower southerly aspects historically had low intensity fires, under-burns with return intervals of 15-25 years. The upper southerly slopes are commonly lodgepole pine with multistoried stands of western larch and Douglas-fir mixed with whitepine. They experienced both mixed and lethal stand replacement fires on 80-150 year intervals. Lower northerly aspects have western red cedar in the bottoms and hill slopes with multistoried stands of western larch, Douglas-fir and scattered whitepine. Historically, these moist sites had stand replacement fires at 100-150 year intervals. Upper northerly slopes experienced similar lethal fires but at 150-350 year intervals. These sites are generally multistoried stands of western larch, Douglas-fir and lodgepole pine with Englemann spruce and subalpine fir in the basins. High elevations along the Idaho/Montana divide are generally open grown subalpine fir, historically maintained by mixed non lethal and lethal fires at 100-250 year intervals. In predominately lodgepole pine stands, stand replacement fires occurred at 80-150 years.

Cumulative Impacts of Past Activities

Many of the areas within the project vicinity have been actively managed for timber. Some of this began in the 1950's as harvest focused upon salvage of beetle killed spruce. Later entries occurred in all subsequent decades and varied from white pine salvage to stand replacement harvest methods. For the most part, regeneration has been successful. The exceptions are southerly aspects where lack of overhead shade resulted in harsh site conditions of seedlings and tremendous brush response following prescribed burning. Mining activities have also been a fairly significant part of area history.

The Keeler Mountain Timber Sale project area consists of approximately 640 acres in the Keeler and Lake Creek watersheds. The top of the mountain and Keeler Mountain Lookout lies approximately in the center of the section. The mountaintop is a long north-south oriented ridge with a mixture of subalpine meadows and trees at the 4900 feet elevation. The east half of the section consists of steep canyons, rock ledges, timbered benches with limited access possibilities. Elevations range from 4900 feet at the top of the mountain to 3200 feet along the east section line. There are several steep canyons that flow intermittently during spring snowmelts and run toward Lake Creek. The north and east portions of the section are heavily timbered with moderately sloping terrain (30%-60%) that roll slightly due to ephemeral draws. These draws flow toward the Keeler Creek drainages. The elevation ranges from 4900 feet at the top of the mountain to 4100 feet along the north and west section lines.

Currently there is limited access to the section from an old, steep, low grade road that is only suitable for an all terrain vehicle. The USFS uses this road to access the lookout during high fire danger periods in the summer.

III. CURRENT FOREST CONDITIONS

A. INTRODUCTION

This section describes the current forest conditions on Libby Unit lands and within the project area. Topics discussed are cover type representations, Habitat Type Group Representation, age class distribution and DNRC's' commitments to old growth retention standards as stated in the SFLMP. Other topics that are related to forest conditions are regeneration potential and proposed threatened and endangered plant species. DNRC assessed the current forest conditions from Libby Units stand level inventory (SLI) and from USFS databases. If descriptor lines or boundaries do not line up it is due to slight differences in timber typing procedures and data collection procedures between these two agencies.

B. FOREST HABITAT TYPES

Forest habitat types describe the end result of plant succession (climax plant community). Thus, each habitat type represents a narrow segment of environmental variation and delineates a certain potential for vegetative development (Pfister et.al. 1977).

Habitat types have been grouped together to form Habitat Type Groups (HTGs). These groups represent broader ecological amplitudes of species and environmental conditions. The use of habitat types and habitat type groups are important tools in predicting timber growing potential, silvicultural treatments, insect and disease conditions, fire regimes and wildlife habitats.

There are three major habitat type groups present within the Project area: warm and moist (Group D), cool and moist (Group E), and cool and moderately dry (Group H) (see Habitat Type Groups map for Keeler project area Figure 3 -1). In addition, the moderately warm and dry (Group B) and non-forested areas represent a minor portion of the analysis area. The three major habitat type groups listed (HTG D, E & H) contain relatively productive timber growing sites.

Habitat type group, percent of lands and climatic description for Libby Unit's lands and the Project Area are shown in Table 3-1.

Figure 3-2 represents the Habitat Type Group for the surrounding USFS lands.

FIGURE 3-1: HABITAT TYPE GROUP MAP FOR KEELER MOUNTAIN TIMBER SALE

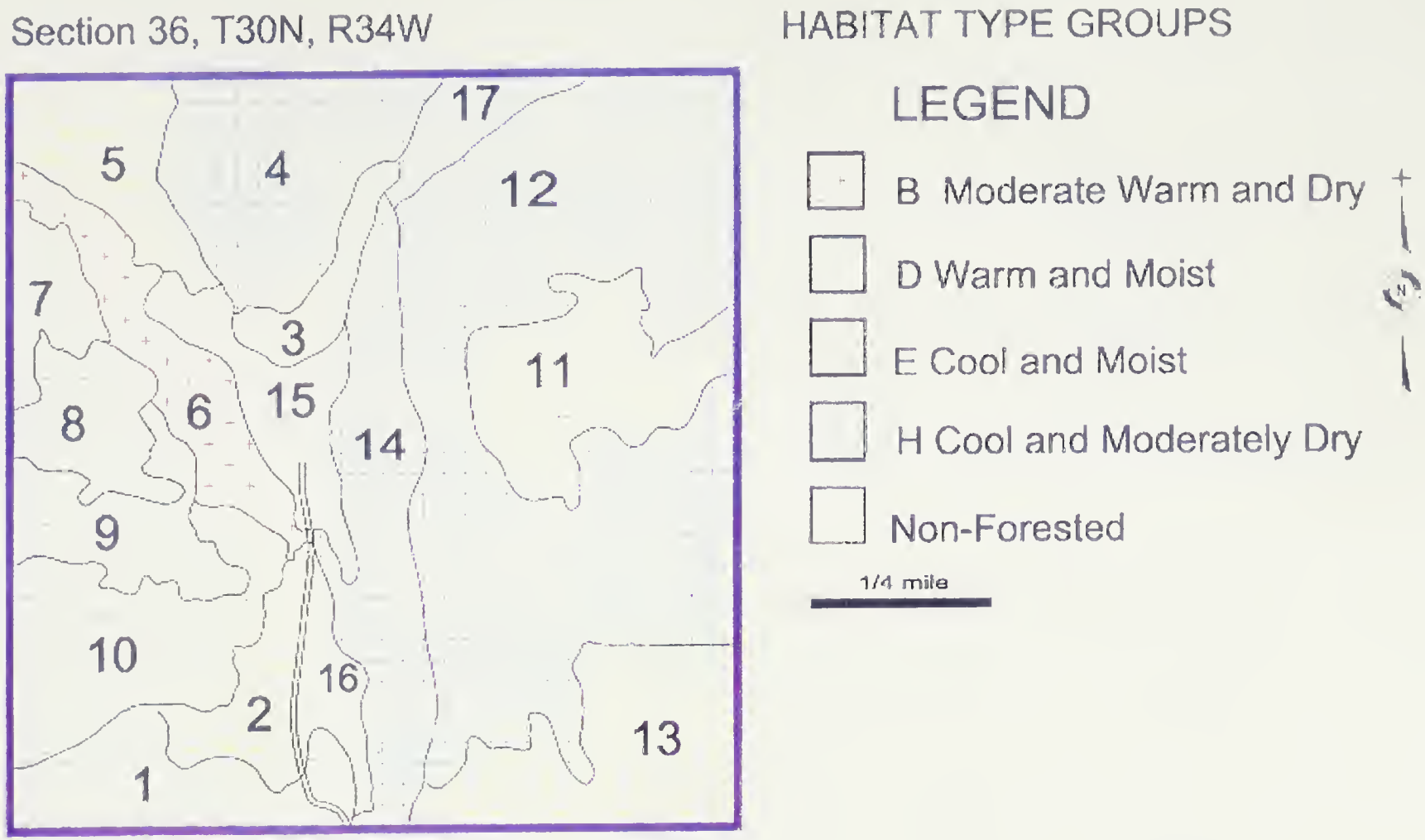


FIGURE 3-2: HABITAT TYPE GROUP MAP FOR SURROUNDING USFS LANDS

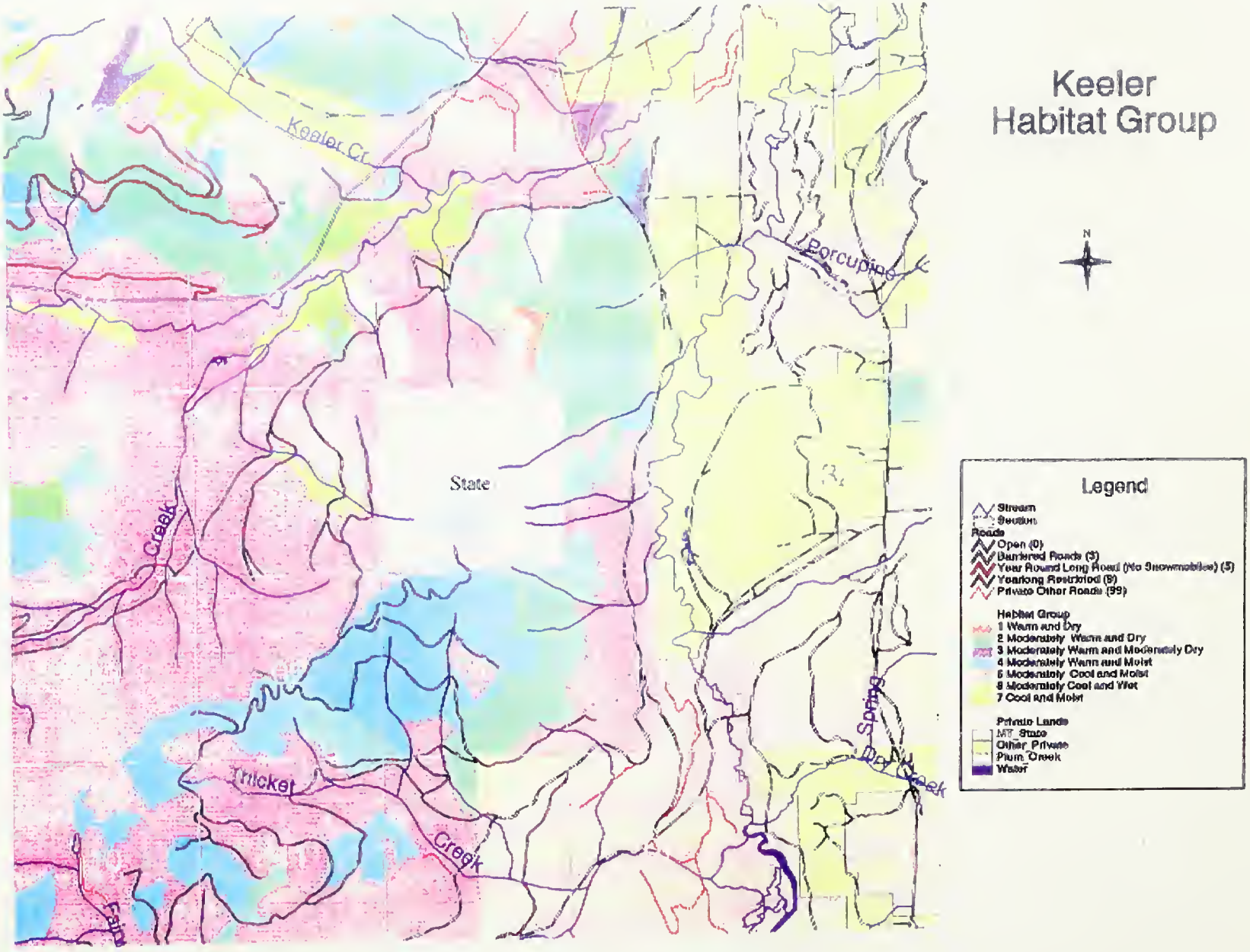


Table 3–1: Habitat Type Group, Climatic Description and Percent of Landbase for Libby Unit Lands and Project Area

Habitat Type Group	Climatic Description	% of Libby Unit Lands	% of Project Area
A	Warm and Dry	19.1	0
B	Moderately Warm and Dry	36.9	4.7
C	Moderate Cool and Dry	5.1	0
D	Warm and Moist	12.6	20.6
E	Cool and Moist	2.5	23.1
F	Wet	0.5	0
G	Moderate Cool and Moist	18.2	0
H	Cool and Moderately Dry	1.8	45.9
	Roads and Non Forested	3.3	5.7

Habitat Type Group B (Moderately Warm and Dry):

The habitat types in this group are moderately productive. Moisture availability is limited during the late summer. Within the project area, there is a rocky northwest oriented ridge (Stand 6) with shallow soils. The shallow soils can be attributed to the dryness of this site.

Historically, wildfire has helped maintain the seral species in much of this group. The four key species within this group (Douglas-fir, ponderosa pine, lodgepole and western larch) are adapted to fire, and regenerate well following disturbance.

Non-Forested

The non-forested lands within the project are located along the north south ridge along the top of the mountain (stands 15 & 16). This ridge has shallow rocky soils and a short growing season. Due to the severe limitations of reforestation, these areas are not typically entered for timber harvesting.

Habitat Type Group D (Warm and Moist):

Temperature and moisture conditions approach optimum for vegetative diversity and growth in this habitat type group. Mixed conifer stands of western larch, Douglas-fir, western whitepine, Englemann spruce, lodgepole pine, grand fir, western red cedar and western hemlock are common.

Wildfire occurrence is moderate to high on grand fir types and low to moderate on cedar and hemlock types. When these types burn, high intensities can be expected with complete burning of vegetation.

Heart rots are prevalent in over-mature stands of grand fir, larch, western red cedar and western hemlock. Rot can be a problem, particularly in grand fir and Douglas-fir. The risk of attack by mountain

pine beetle in lodgepole pine increases when the average DBH increases to 8 inches plus these sites are conducive to white pine blister rust infection.

Approximately 57 acres in this type (Stands 7, 8 & 9) are densely stocked 80-year-old lodgepole stands with small inclusion of Douglas-fir and larch. These stands were formed by the stand replacing fire that occurred in 1910.

Adjacent to these lodgepole stands is a 42 acre patch of 150 year old old-growth (Stand 2). This stand appears to have been missed by the 1910 fire, which burned, on each side of it. This stand is primarily Douglas-fir, grand fir, western larch and western hemlock with minor amounts of western whitepine, western cedar and Englemann spruce.

Approximately 32 acres (Stand 1) of this HTG consist of 100+ year old Douglas-fir, grand fir, Englemann spruce, lodgepole pine with minor amounts of larch and alpine fir.
There is evidence of root disease in this stand and in the adjacent USFS timber stands to the south.

Habitat Type Group E (Cool & Moist):

The timber stands in this HTG are moderate to highly productive and demonstrate high species diversity. Common species are Douglas fir, Englemann spruce, lodgepole pine, subalpine fir and grand fir. Wildfire occurrence is infrequent in these types but high intensities can be expected with complete burning of vegetation when they occur.

Root rots and stem decays are a primary mortality or decay causal agent in most conifers. Heart rots are prevalent in overmature stands of grand fir and larch. Approximately 149 acres comprise this type (Stands 2, 3, 5, 11 & 13). These stands lie primarily in protected draws or north aspects where cool and moist environments are expected.

Habitat Type Group H (Cool and Moderately Dry):

Project area stands in HTG H range from moderately productive to highly productive. The climate in this group is characterized by a short growing season with early summer frosts. Moisture availability is limited during the late summer as a result of slope position, aspect, shallow soils or a combination of these factors. Stands in this group are usually dominated by seral species. Lodgepole pine, western larch and Douglas fir are the seral dominants with Englemann spruce and subalpine fir occurring as minor components. Wildfire occurrence is moderate with a frequency of 20 to 50 years. Most fires are low to moderate in intensity but stand replacement fires will occur as fuel loads increase.

In this HTG heart rots are present in overmature trees. Root rots can be a problem within all habitat types in this group, but most pockets of infection are isolated and small in size. Fir engraver mortality may occur in true fir stands, especially in stands infected with root disease.

Approximately 294 acres is a multi-aged stand resulting from this same moderate fire regime. Most of the stand is 80 – 100 years old with a few scattered relics that survived the 1910 fire. There are not enough old trees for these stands to have old growth characteristics.

C. PATCH CHARACTERISTICS

Historically, wildfire was the most prevalent disturbance mechanism in the area creating mosaics of vegetation patches of varying age classes and cover types. Today's forest pattern is the remnant of the large modeling patterns of past fire and incremental remodeling through harvest activities.

The major silvicultural practices used were some form of regeneration harvest. Regeneration harvest was extensively advocated partially in effect to mimic fire roles in preparing the site for seral species, as well as, to achieve fullest utilization of products with economical harvest. Decades of incremental harvests have diversified the larger natural burn patterns resulting in smaller more numerous patches on the adjoining ownerships.

Recorded fire history for the Keeler Project Area Figure 3-3 demonstrates the patch sizes created by fires over time. As previously described many of the fire disturbances covered thousands of acres. Long term fire suppression has allowed succession to continue more affected by the minor elements of windthrow and insect and disease.

Figure 3-4 demonstrates the smaller patch openings surrounding the project area that have been created by the past decades of harvesting. Current patch size is generally considered to be smaller than what existed prior to 1900.

FIGURE 3-3: RECORDED FIRE HISTORY FOR THE KEELER PROJECT AREA

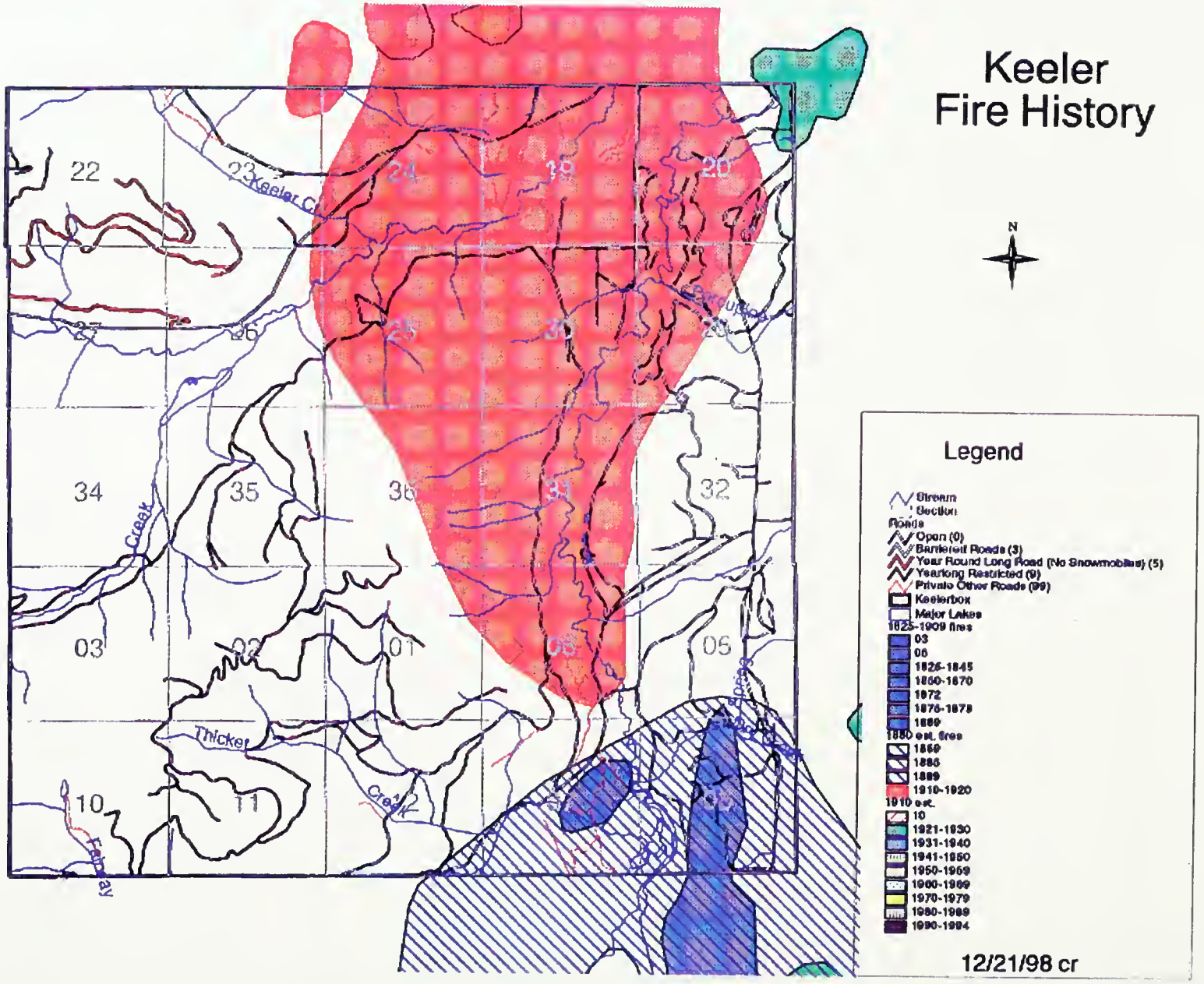
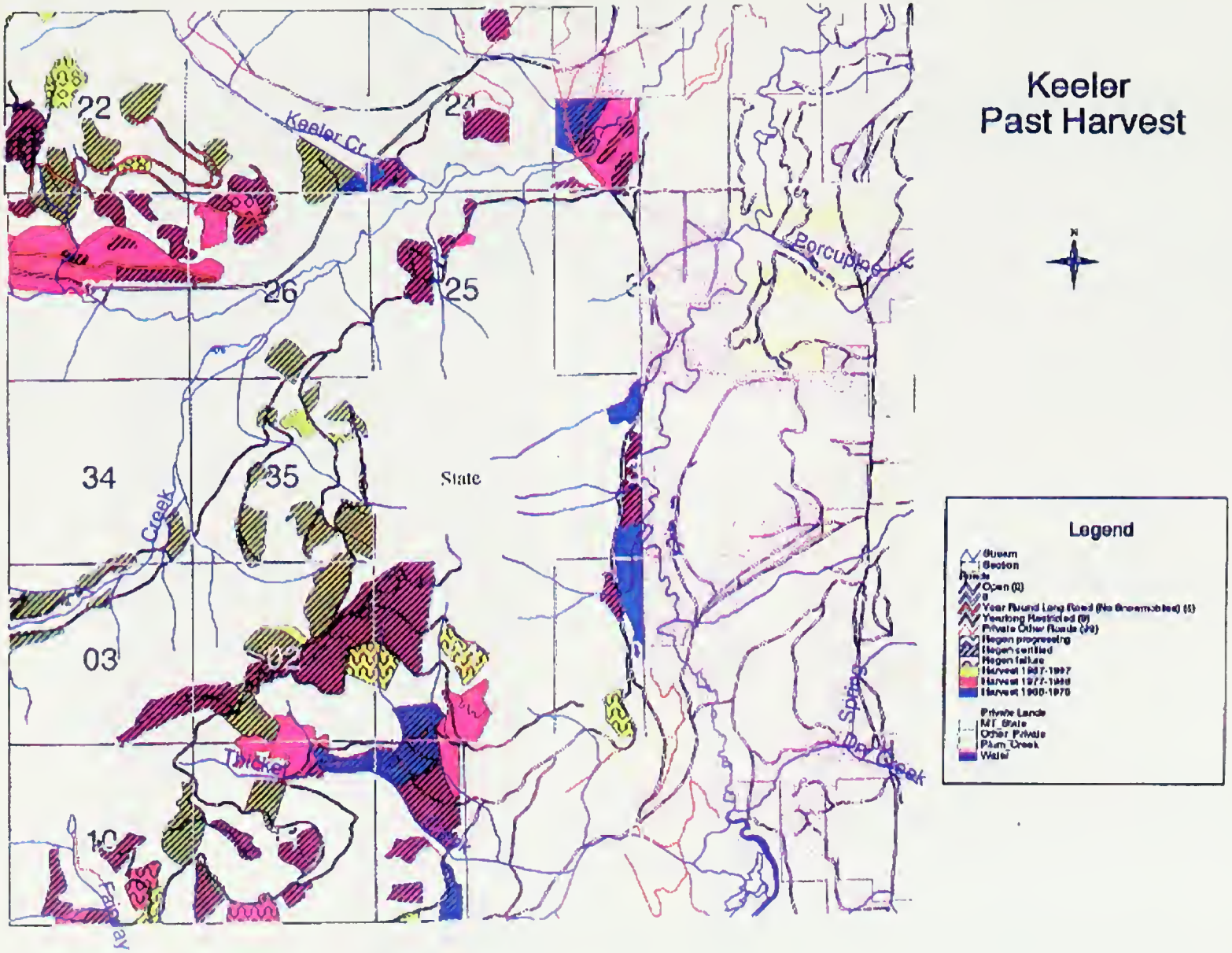


FIGURE 3-4: KEELER PAST HARVEST HISTORY



D. COVER TYPE REPRESENTATION

Man's manipulation of the environment through the exclusion of fire, introduced pathogens and timber harvesting have shifted many forest cover types away from there historic cover type conditions.

To analyze what the historic forest conditions may have been, two filters were developed and applied to Libby Unit's current Stand Level Inventory data. The filters were assigned cover types similar to those used in the 1930's inventory. One filter used the 1930's criteria as closely as possible. This represents current conditions (filter 2) when used with current inventory data. The other filter (filter 1) or the appropriate conditions filter assigned cover types using criteria primarily designed to address the situation where succession from one cover type to another was occurring. The appropriate conditions filter was developed to indicate areas which in the absence of fire suppression, introduced pathogens, and timber harvesting would likely have been assigned to a different cover type than the current cover type filter would suggest. Filter 1 estimates what the stand would have looked like in 1900 from the current condition of the stand.

The inventory data from the 1930's, referred to above, was used by Losensky (1993) to estimate the proportion of the various stand-structural stages by cover type in the Inland Northwest in 1900. This provides one estimate of the natural characteristics of forests prior to fire suppression and extensive logging. Losensky has since (1997) worked with Montana DNRC to complete an analysis for the entire state; some of the vegetation types that are subject to that work are included in this analysis.

Figure 3 - 5 illustrates the current cover types on Libby Units lands (filter 2) in comparison to the appropriate condition (filter 1) or what might have been historically expected in natural disturbance regimes had taken place since 1900.

Figure 3 – 6 illustrates the existing cover types for the project area (filter 2) in comparison to the appropriate conditions or what might have been historically expected (filter 1).

Figure 3 – 7 shows the current cover type representation for the existing surrounding Kootenai National Forest lands.

The data from Figure 3-5 and 3-6 illustrates, that currently there are more Mixed Conifer and Alpine fir stands than may have been expected using historic data. Many of the species that make up these cover types are shade tolerant and increase in the species composition as the interval between disturbances, such as wildfire, is lengthened. Conversely, the data indicates that there is less western larch/Douglas fir cover types than may have been expected from historic data. Western larch is a species that is not shade tolerant and stands are perpetuated through fairly intensive disturbances, such as wildfires.

FIGURE 3-5: CURRENT AND APPROPRIATE COVER TYPES FOR LIBBY UNITS LAND

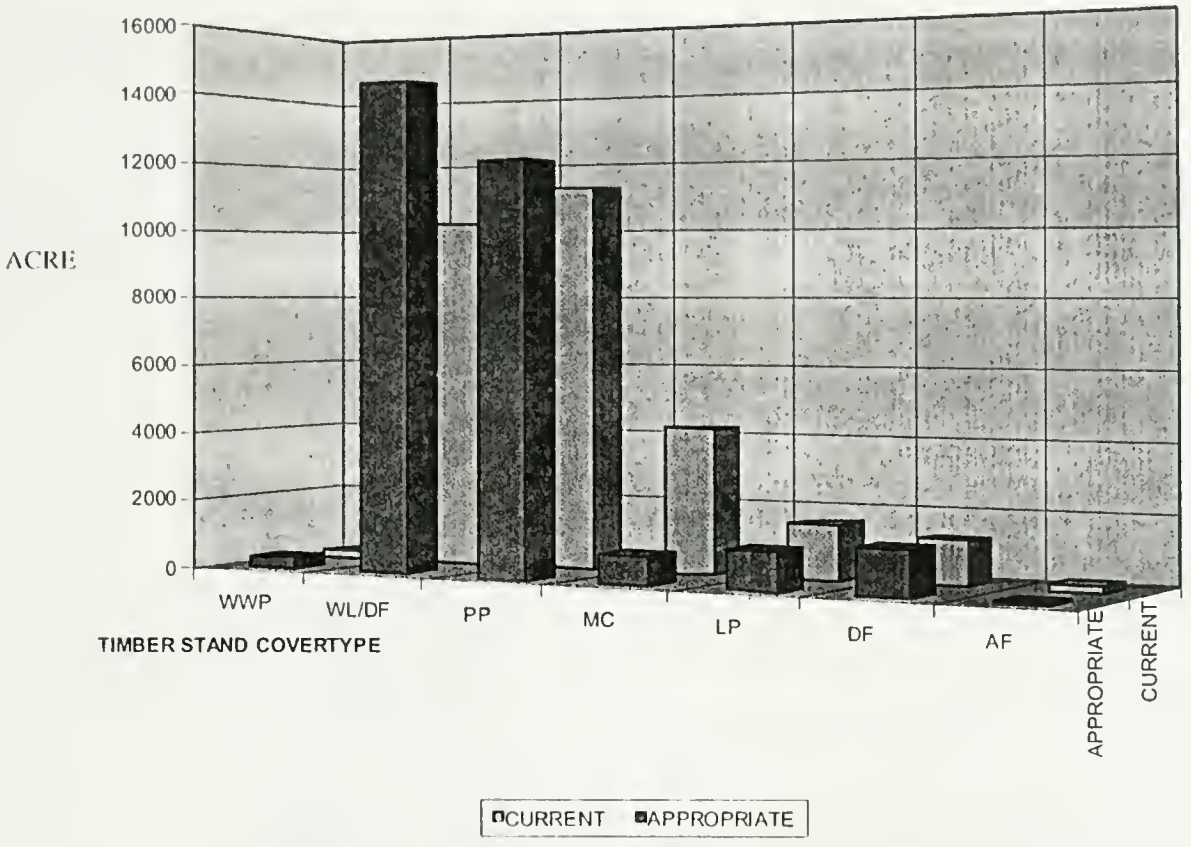


FIGURE 3-6: CURRENT AND APPROPRIATE COVER TYPES FOR PROJECT AREA

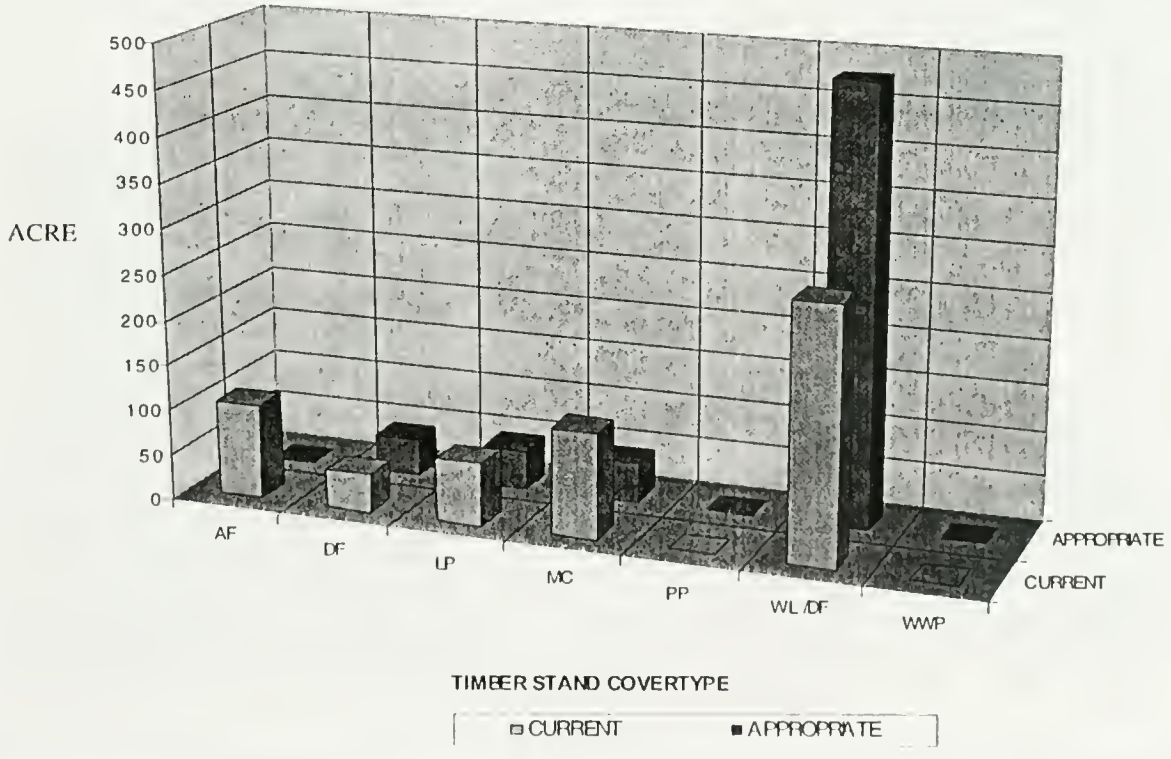
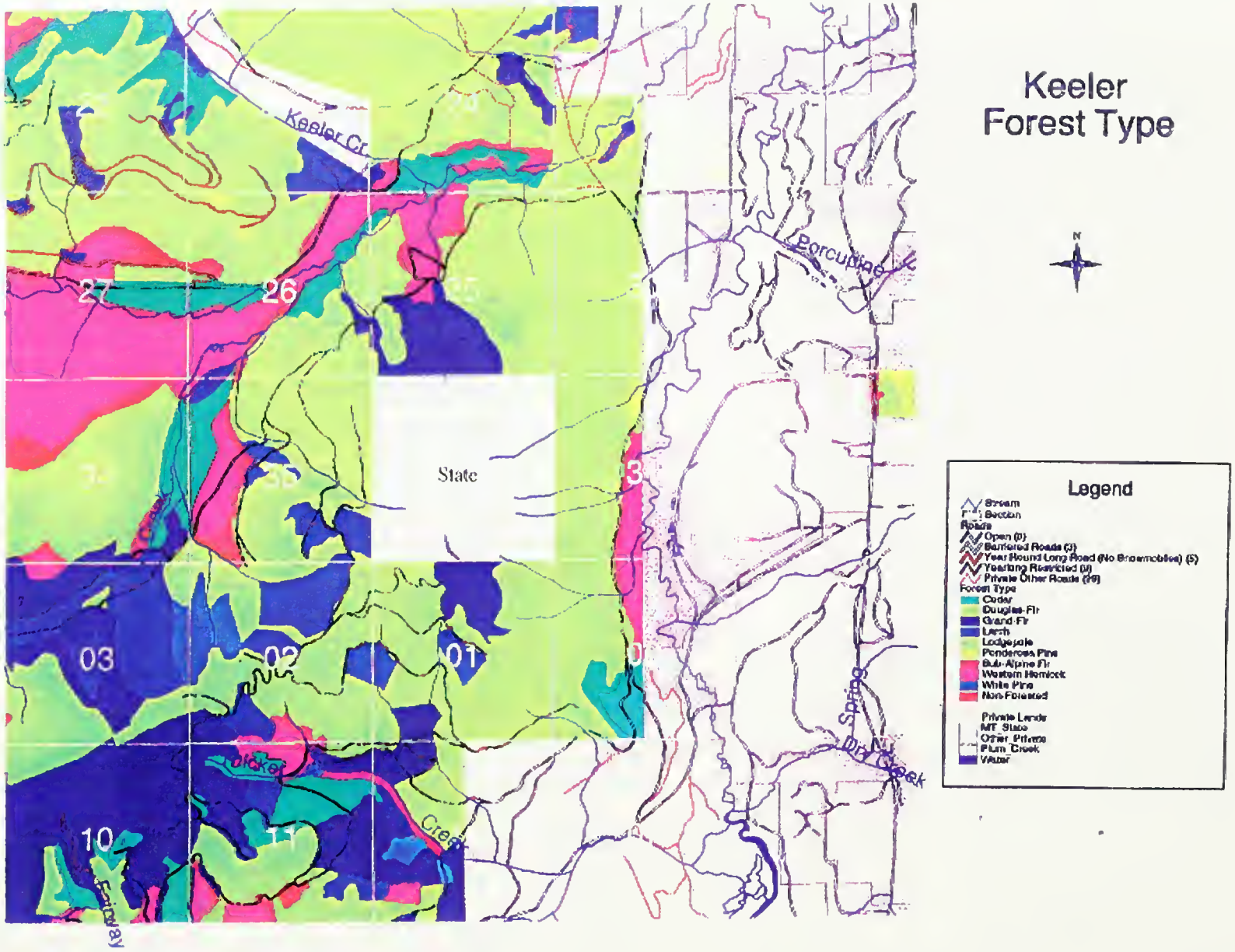


FIGURE 3-7: COVER TYPE REPRESENTATION OF SURROUNDING USFS LANDS



E. AGE CLASS DISTRIBUTION

Age-class distributions delineate another characteristic important for describing average historical or appropriate conditions. Combining information on age class distribution with cover type information help to demonstrate average forest conditions over time.

The 1930's inventories quantified the ages for forest stands. Losensky examined the data and projected the data back in time to the early 1900's to arrive at age estimates. This data is useful in setting baseline conditions for determining the extent to which current forest age-class distributions deviates from average historical conditions. Figure 3–8 *(pie chart)* and Table 3–2 compares the current condition of age classes on Libby Units lands, the Keeler Mountain project area, and the historic conditions for Climatic Section M333B (Losensky, 1997).

FIGURE 3-8: AGE CLASS DISTRIBUTION OF LIBBY UNIT LANDS AND THE PROJECT AREA, AND THE HISTORICAL CONDITIONS FOR CLIMATIC SECTION M333B

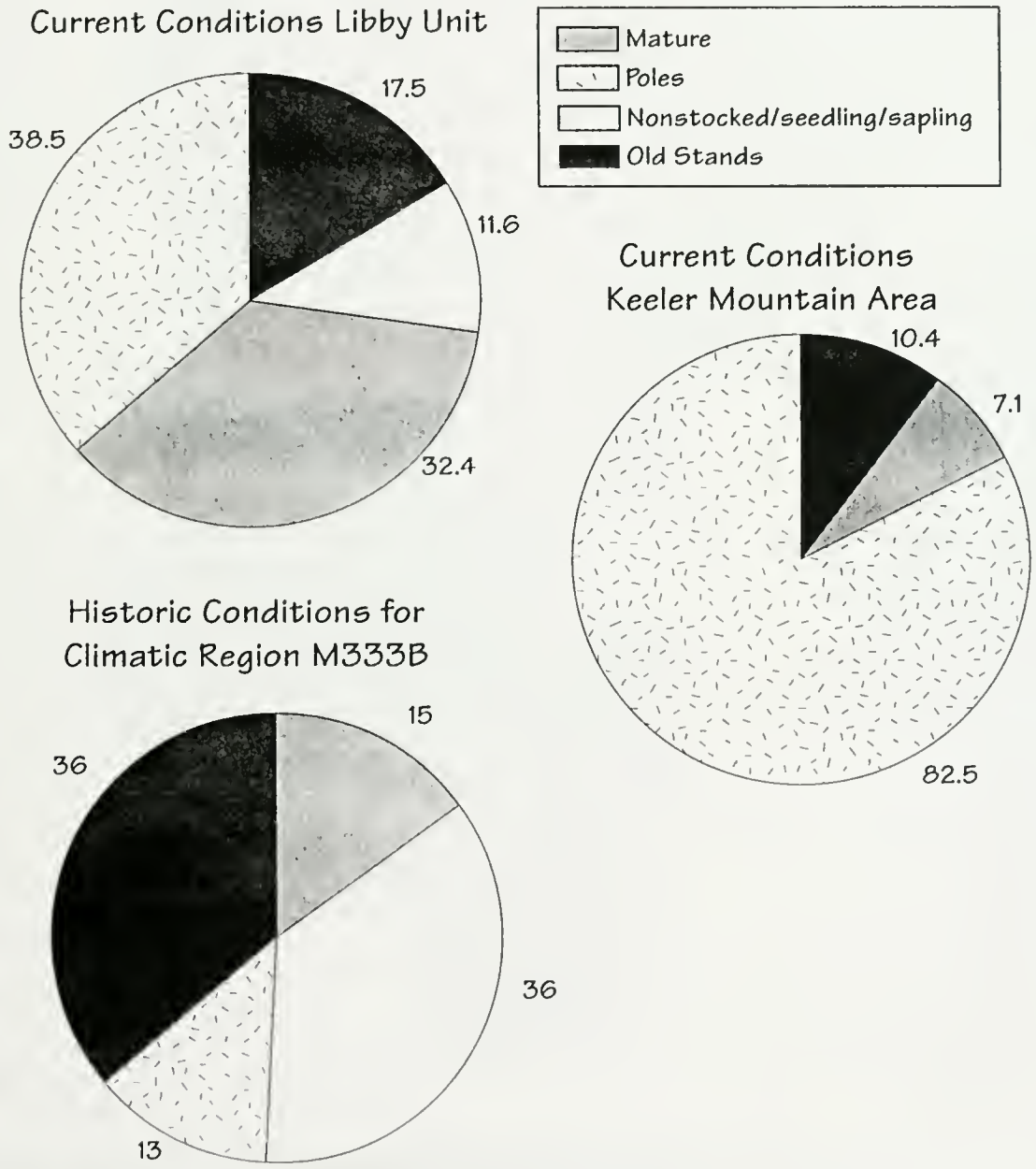


FIGURE 3-9: AGE CLASS DISTRIBUTION FOR SURROUNDING USFS LAND

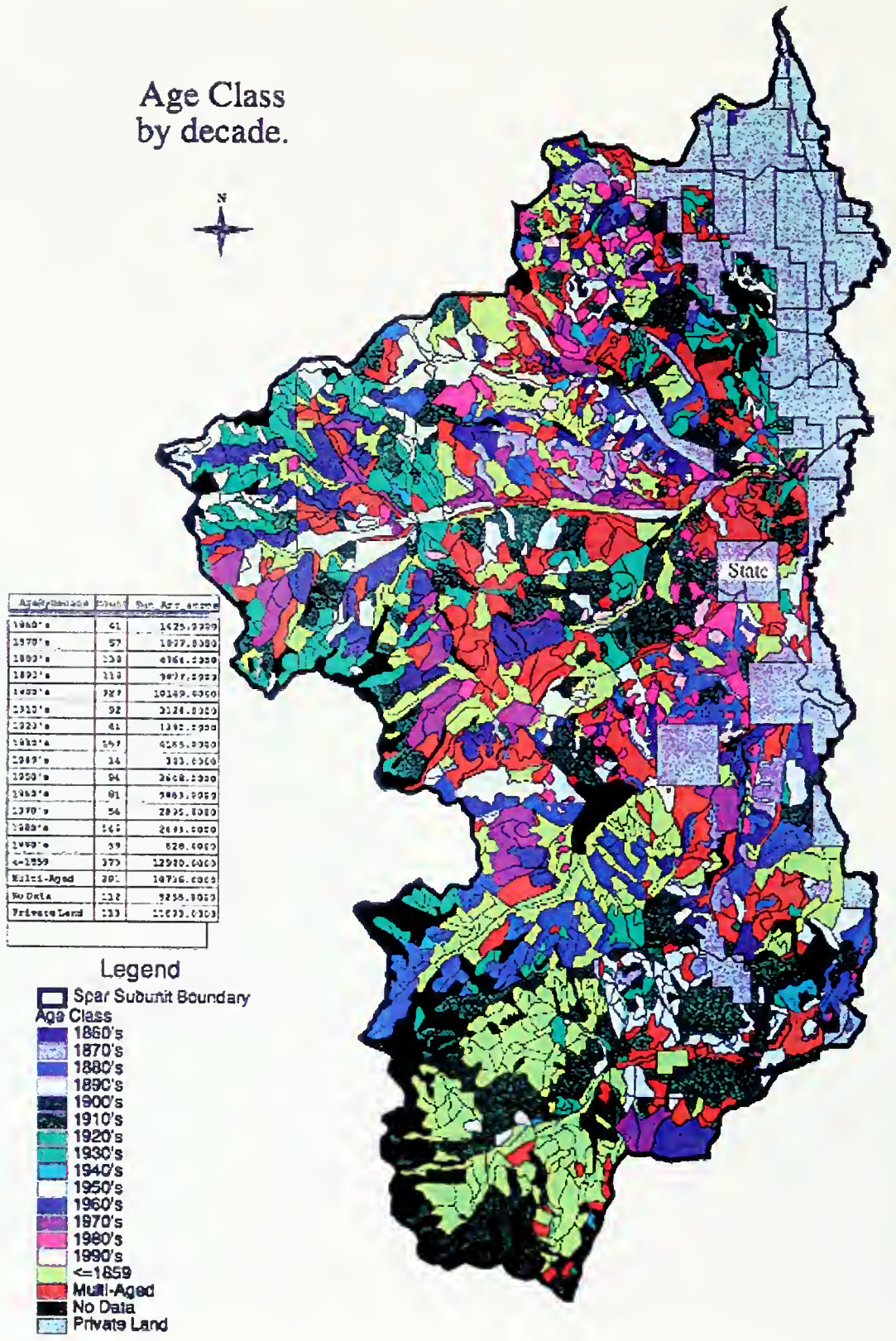


TABLE 3 – 2: PERCENTAGE OF AREA/AGE CLASS

TABLE 3 – 2 PERCENTAGE OF AREA/AGE CLASS				
	NONSTOCKED/SEEDLING/ SAPLING 0-39	POLES 40-100	MATURE 100-OG	OLD-GROWTH STANDS
Climatic Region M333B	36.0	13.0	15.0	36.0
Current Condition of Libby Unit lands	11.6	38.5	32.4	17.5
Current Condition of Keeler Mountain Project	0	82.5	7.1	10.4

Comparing the age class distribution of Libby Units lands with the data from the 1930's data show that Libby Unit is low in stands of the seedling/sapling and old stand age classes and high in the pole and mature timber age classes relative to the 1930's data.

Historical records from Libby Units lands indicate that a small amount of selective harvesting was initiated at the lower elevations in the 1920's through the 1950's. These harvests targeted some of the large seral dominants in the stands, such as western larch, western white pine, ponderosa pine and Douglas fir. This resulted in stand compositions heavy in shade tolerant species (subalpine fir, grand fir, cedar and hemlock). In the late 1960's even-aged harvesting methods, primarily seedtree and clear-cut harvest occurred. The species mix that resulted from the even-aged regeneration harvests was primarily ponderosa pine, larch and Douglas fir. In the 1980's large areas were entered removing the lodgepole pine and ponderosa pine that were infested with Mountain Pine Beetle.

The effects of the even-aged regeneration harvesting are shown in the 0 to 39-year age class. Many of stands in the 40-99 year age class are a result of the 1910 fire and through the partial harvesting practices that occurred in the 1920's through 1950's. This partial cutting practice targeted the largest and oldest trees. This resulted in decreasing the average stand age and in-growth of younger shade tolerant species. The timber stands in the 100 years old and stands replacing fires prior to 1900's or Euro-American settlement created older age classes.

The Keeler project area is relatively small and so, given the often-large sizes of natural disturbances should be viewed to simply show the age class representation in the project area. The age-class structure representation in the project area would indicate in the lack of large stand-replacement event such as wildfire in the past 80+years.

The majority of the vegetative cover within the project area can be typified as being mature timber 80-90 years old and stands greater than 150 years. The last fire that burned in the area was a large fire that occurred in 1910. This fire burned with varying intensities and created different patch sizes and mosaics as a result of the variation in the intensity of the fire. Since this time fire suppression has excluded the effects of fire from the area.

There has not been any significant logging within the project area except for the removal of a small amount of timber volume when a low-grade road was built to access the lookout on top of the mountain.

The age class distribution of the adjacent National Forest lands have been primarily shaped by large fires that occurred in 1910 and earlier (prior to Euro–American settlement) and through regeneration harvests and road building that occurred in the 1970's and 1980's. The results of these regeneration harvests have fragmented the landscape and created smaller and more numerous patches than may have occurred through natural fire disturbances. Figure 3-9 shows the age class distribution of the stands surrounding the project area.

F. APPROPRIATE CONDITIONS AND OLD GROWTH

The SFLMP stated that "within an appropriate analysis area, DNRC would seek to maintain or restore old-growth forest in amounts of, at least, half the average proportion that would be expected to occur with natural processes on similar sites." For this analysis, current amounts of old growth stands from Libby Unit's SLI data will be compared with summaries of 1930's percentages of old stands from the climatic section (Losensky 1997). The portion of old growth stands by cover type within a given analysis area, compared to the climatic section proportion of old stands from the 1930's inventory, is DNRC's numeric criterion for assessing compliance with our commitment to retaining a minimum of 50 percent of old growth amounts that would be expected to occur with natural processes on similar sites.

Cover Type Representations and Old-Growth Minimum

To determine appropriate conditions, a set of filters was developed to use on our SLI. As a first step, this procedure looks at species representation to determine what would be appropriate condition in terms of cover-type representation across Libby Unit's lands.

Table 3-3 describes the protocol for assigning appropriate cover types from our current inventory. Stands are evaluated against the criteria in the table beginning with white pine and proceeding down the Cover Type column. Once assigned, a stand is not evaluated against other cover-type criteria. This procedure is referred to as the Appropriate Conditions Filter. For example, if our Stand Level Inventory (SLI) shows that a stand is currently composed of D 10 percent of white pine, then the stand is categorized as an appropriate white pine stand. A subsequent stand may have < 10 percent white pine and D 20 percent ponderosa pine in its current composition. This stand would be categorized as an appropriate ponderosa pine stand. This procedure has been applied to all stands in Libby Unit accordance with Table 3-3, until all stands have been categorized into their appropriate conditions. There is no supposition that this filter is the end-all, be-all indicator of appropriate conditions. Rather it represents a methodology, founded in succession theory, that we use for a first approximation of appropriate cover type representation. Additionally, local knowledge of particular stands by unit foresters, and inventory specialists was used to adjust the Appropriate Conditions filter.

DNRC's commitment to old growth retention by cover type is calculated by multiplying one-half the proportion of each cover type that existed in the 1930's inventory as old stands (Losensky 1997) by the appropriate proportion of Libby Units land by cover type. The product is then multiplied by the forested acres (29,689) on Libby Units lands to indicate the minimum acres of old-growth stands to maintain. The appropriate proportion of cover types is merely the proportion of appropriate acres of each cover type (based on the Appropriate Conditions filter) for Libby Unit.

TABLE 3-3: PROTOCOL FOR ASSIGNING APPROPRIATE CONDITIONS BY COVER TYPES

TABLE 3-3 PROTOCOL FOR ASSIGNING APPROPRIATE CONDITIONS BY COVER TYPES

Cover Type*	Proportional Representation (%) of Species in Each Cover Type				
	Ponderosa Pine	Douglas-fir	Western Larch	Western White Pine	Lodgepole Pine
Western white pine				♀ 10	
Ponderosa pine	♀ 20				
Western larch/Douglas-fir		Western larch/Douglas-fir ♀ 30 (western larch present)			
Douglas-fir		♀ 50			
Lodgepole pine					♀ 40
Mixed conifer	Habitat type < 630 and stands not yet assigned.				
Sub-alpine types	All remaining stands.				

* Types were assigned in the order listed. Once assigned a stand was not subjected to subsequent assignment criteria.

TABLE 3-4: DNRC OLD-GROWTH RETENTION COMMITMENTS ON LIBBY UNIT

TABLE 3-4 DNRC OLD-GROWTH RETENTION COMMITMENTS ON LIBBY UNIT				
COVER TYPES	1/2 OLD STAND PERCENTAGE FROM LOSENSKY (1997)	APPROPRIATE PORPORTION OF LIBBY UNIT LANDS BY COVER TYPE (PERCENTAGE)	MINIMUM ACRES OF OLD GROWTH TO RETAIN	EXISTING ACRES OF OLD GROWTH
Ponderosa pine	30.0	40.0	3,564	* 2201
Douglas-fir	6.5	4.4	85	106
Western larch/Douglas-fir	17.0	47.7	2,416	*1991
Western white pine	12.0	1.1	39	66
Lodgepole pine	1.5	3.6	16	*0
Mixed conifer	27.0	3.0	238	870
Subalpine	10.0	< 1	5	21
* Indicates cover types that are short of retention standards set by SFLMP Biodiversity Implementation Guidance. There are 29689 forested acres on the Libby Unit.				

The data presented in Table 3–4 shows that Libby Unit lands area are below its minimum old growth retention standards that were set by the SFLMP in the western larch/Douglas-fir, lodgepole pine and ponderosa pine cover types. Libby Units last stand level was completed in 1989. Since this inventory 60 MMBF of timber has been harvested, some of it was old growth. The data reflected in the old growth analysis is currently the best information available to quantify Libby Units old growth amounts. The stands in the project area were inventoried in 1997 as part of the project planning process. The old growth stands and acreage have been verified as being accurate. Libby Units lands are currently being re-inventoried and a new SLI data base will be available in the next year.

G. OLD GROWTH – RECRUITMENT SCHEDULE

The SFLMP calls for the maintenance of sufficient acres to replace old growth that may fall apart, die or burn. The proportions were calculated using a Weibull function for age class distribution. The Weibull

TABLE 3-5 OLD GROWTH REPLACEMENT SCHEDULE (BASED ON WEIBULL FUNCTION)

TABLE 3-5 OLD GROWTH REPLACEMENT SCHEDULE (BASED ON WEIBULL FUNCTION)			
COVER TYPE	OLD GROWTH MINIMUM PERCENTAGE	MINIMUM PERCENTAGE IN THE 110-YEAR AGE CLASS AND UNDER	MINIMUM PERCENTAGE IN EACH CLASS BETWEEN 110 AND 150
Ponderosa pine	30	NA*	NA*
Douglas-fir	6.5	2.4	1.0
Western larch/Douglas-fir	17.0	3.5	2.5
Western white pine	12	3.2	1.9
Lodgepole pine	1.5	1.8	0.8
Mixed Conifer	27	3.5	2.5
Subalpine fir	10	3.3	2.0
1) The 150-year age class is used in the DNRC inventory that class corresponds best to Losensky old-stand designations. 2) Lodgepole pine becomes old growth at 140, so the 0.8 refers to the 110-year to 140-year age classes.			

* Ponderosa pine recruitment acres will be managed through uneven aged management.

function uses both the fire return interval and a shape parameter to fit the age-class curve. This curve indicates the proportion of stands needed in each age class. Table 3 - 5 shows the cover types and percentages of stands needed in the 110-year and 150 years. Age classes cover 10 years (e.g., the 110 class is from 110 – 119). None of the cover types are short of old growth recruitment acres.

H. REGENERATION POTENTIAL

The project area has never received a regeneration harvest treatment, however there are numerous regeneration harvests surrounding the project area. For the most part, regeneration has been successful. The exceptions are southerly aspects where the lack of overhead shade and tremendous brush response following prescribed burning resulted in harsh site conditions for seedling. Survey records on the Three Rivers Ranger District have been analyzed for each habitat type group where regeneration harvest treatment is planned. Habitat type group D has had a 93% success rate for plantings within 5 years and HTG E has had a 92% success rate within 5 years. All of Libby Unit lands within these HTG's that have received regeneration harvests have adequate stocking levels.

PROPOSED, THREATENED, ENDANGERED AND SENSITIVE (PTES) PLANTS

Maintenance of viable sensitive plant populations is a concern for this project because of the proposed ground-disturbing activities associated with timber harvesting and road building. These activities have the potential to impact PTES plant populations.

A PTES field survey was conducted in June of 1998. Prior to field work, the Biological Conservation Database, maintained by Montana Natural Heritage Program, was queried for occurrence of Montana Plant Species of Special Concern know from the vicinity of the project area. This list, conditioned by habitat constraints, was used to identify primary targets for field survey to guide survey routes and timing. In addition to the database query local Kootenai National Forest Botanists were consulted concerning potential for occurrence of sensitive plant species in the vicinity of Keeler Mountain. One Montana plant species of special concern was found in the project area. This is the fringed onion (Allium Fibrillum). This plant population was mapped on aerial photos and topographic maps, population boundaries were marked on the ground with glow pink flagging, population surveys were conducted, and standard Montana Natural Heritage Program field survey forms were completed.

The Allium fibrillum occurs in at least seven sub-populations comprising about 40 acres of occupied habitat along the ridgetop and on the side ridges of the east flank of the mountain. Total individuals are estimated in the low tens of thousands. It is considered a significant, large and healthy population.

IV. WILDLIFE

A. Coarse Filter

DNRC recognizes that it is an impossible and unnecessary task to assess the existing environment or the effects of proposed actions on all wildlife species. We assume that if landscape patterns and processes similar to those that species adapted to are maintained, then the full complement of species will be maintained across the landscape (DNRC 1996). This coarse filter approach supports diverse wildlife populations by managing for a variety of forest structures and compositions that approximate historic conditions across a landscape. On any particular piece of ground, however, individual species that are recognized to be of special concern are evaluated (a fine filter analysis) and those are the species that are addressed below. They include wildlife species federally listed as Threatened or Endangered, species listed as sensitive by DNRC and species managed as big game by Montana Fish, Wildlife, and

Parks. On smaller and/or scattered DNRC ownership (such as Keeler Mountain), we are frequently not able to provide for appropriate representation of forest conditions at the large landscape scale. Our activities are still based on maintaining or restoring a semblance of historic conditions, but on DNRC lands administered at the DNRC Unit level. We would manage to maintain rare or unique habitats and make reasonable attempts to pursue cooperative planning with major adjacent landowners (DNRC 1996). The Kootenai National Forest land surrounds the Keeler Mountain Project Area on all sides and access to the project area is primarily along USFS roads.

B. THREATENED AND ENDANGERED SPECIES

Four terrestrial or avian wildlife species are federally listed as Threatened or Endangered in northwest Montana: peregrine falcon, bald eagle, wolf, and grizzly bear.

Peregrine Falcons: In the west, peregrines typically nest on mountain cliffs or in river gorges. Foraging habitats are usually open areas such as marshes, estuaries, and croplands. Neither nesting nor foraging habitat exists on the project area. While there are no resident peregrine falcons in the project area, migratory falcons may seasonally use the area.

Bald Eagles: Bald eagles do not nest in the project area and the area (a steep, dry hillside more than a mile from a large, perennial water source) is not suitable as potential nesting habitat. However, there is an active bald eagle nest near the north end of Bull Lake. There is no site specific habitat management plan around this nest so the nest site management zone concept is applied (MT Bald Eagle Management Plan, 1994). Under the zone concept, 3 concentric circles with radii of 0.25 miles (nest site area), 0.50 miles (primary use area), and 2.50 miles (home range) are evaluated around the nest for their suitability to support the resident eagles. The east half of the project area is approximately 2 miles from the nest. This portion of the project area is big game winter range and, therefore, provides potential foraging opportunities for both resident nesting bald eagles as well as non-breeding eagles.

Wolves: The project area is within the Northwest Montana Wolf Recovery Area. In northwest Montana, wolf territories tend to be focused around intermountain valleys that support large wintering populations of white-tailed deer and, less commonly, mule deer and elk. Steep habitats that typify many elk and mule deer winter ranges are less suitable for hunting by wolves. Dens and early rendezvous sites are usually in relatively low elevation, riparian associated habitats within, or near, winter ranges. Late summer and autumn habitat use is more dispersed. Habitat management for wolves primarily involves maintenance of their big game prey base, overall security (mainly by minimizing motorized access and controlling trapping), and site specific protection of den and rendezvous sites.

The project area is not known to be used by wolves. The area is steep on all sides with few benches, except for the ridge top, and no perennial surface water - habitat generally not considered suitable for wolf dens or rendezvous sites. The east half of the project area is mule deer and elk winter range. The relatively steep slopes on this winter range, averaging about 50%, are not conducive to efficient hunting by wolves. Road density in the project area is currently low; an existing ORV road extends one-half mile into the middle of the section to the Keeler Mountain Lookout. Security in the project area is fair (there are no open roads) however the lookout and ORV trail occupy the only flat land in the section and the valley bottom along Lake Creek, to the east, has several highways and other developments along it.

Grizzly Bear: The project area is in the Cabinet Yaak Ecosystem (CYE) Grizzly Bear Recovery Area. Specifically, the project area is within Bear Management Unit (BMU) #03 in the CYE. BMU #03 is comprised of approximately 118 mi^2, with 114.3 mi^2 in Situation 1 habitat. This BMU is further divided into six Bear Analysis Areas (BAA). The proposed project would occur in BAA 3-1 and 3-4. No den sites are known to exist in the project area, however, some spring bear habitat is located on the east face of Keeler Mountain.

Within each BMU, several management objectives were defined. Guidelines on habitat effectiveness (HE), open road density (ORD), total motorized access route density (TMARD), displacement (security core) areas, opening size (distance from cover), movement corridors, and timing of projects were developed through the Intercontinental Grizzly Bear Committee (IGBC). The existing condition of BMU #03 falls within the range of the guidelines. The habitat effectiveness in the BMU is 75.4%, which exceeds the 70% value in the standards. The ORD in the BMU is 0.6 mi./mi^2 in the 1997 bear year. Again, this value falls below the standard of <0.75 mi/mi^2. Both, BAA 3-1 and 3-4 exceeds this standard. Since these BAA's are above the guidelines prior to the project, the road densities during the project can increase, but will not cause the BMU ORD to exceed the 0.75 standard. The TMARD is 2.2 mi./mi^2 for the BMU. Three core areas are located in this BMU, totaling 65 mi^2 (59%). Currently, no openings larger than 40 acres occur in the project area.

C. SENSITIVE SPECIES

Sensitive species include those in which further population declines may warrant listing as Threatened or Endangered or their habitats may be particularly sensitive to disturbance by forest management activities. DNRC maintains a sensitive species list for each of its Areas. For Keeler Mountain (in the Northwest Land Office Area), the following species are listed as sensitive, but neither they nor their habitats occur in the project area and they will be dismissed from further analyses:

- Coeur d'Alene salamander (spring seeps, small cascading creeks, waterfall spray zones)
- Northern bog lemming (bogs)
- Fisher (mature, mesic, low elevation coniferous forests)
- Common loon (lakes)
- Harlequin ducks (swift mountain streams)
- Ferruginous hawk (grasslands)
- Colombian sharp-tailed grouse (grasslands)
- Townsend's big-eared bat (primarily caves)

Sensitive species which either are known to be in the area or potentially have habitats in the project area include flammulated owl, boreal owl, pileated woodpecker, black-backed woodpecker, and lynx.

Flammulated Owl: In western Montana, these insectivorous, cavity-nesting owls are most often found in ponderosa pine/ Douglas-fir habitat types. Preferred foraging and nesting habitat is characterized by mature, ponderosa pine and Douglas-fir forests with open understories. Roosting habitat, by contrast, tends to be in nearby multi-canopied forests with more dense vegetation.

No surveys for flammulated owls have been done in the project area, but habitats in the eastern half of the project area provide flammulated owl habitat as described in the literature (Hayward and Verner, 1994). Stand 12 is dominated by Douglas-fir throughout the unit and large ponderosa pines (ave. dbh = 22 inches) are found at the lower elevations. Similar forest structures extend from stand 12 onto adjacent Forest Service land to the east and northeast. Decades of fire suppression have allowed sapling and pole-sized Douglas-fir and grand fir to increase, reducing the amount of open, mature Douglas-fir/ponderosa pine forest cover type in stand 12. Stands 11 and 13, also in the east half of the project area, seem unsuitable for flammulated owls since they are more mesic and ponderosa pine is rare or absent.

Boreal Owl: Boreal owls inhabit mature to old growth coniferous forests at higher elevations. Cool, moist habitat types dominated by spruce and fir are most commonly used, but use of western hemlock and Douglas-fir habitat types was documented in Montana and Idaho (Hayward et al. 1993). Boreal owls predominantly are found above 5,000 feet elevation in Montana, but use of cool, moist microsites down to 4,200 feet has been observed (Hayward and Verner 1994). Like the flammulated owl, boreal owls are a cavity-dependent species that rely upon other species (primarily pileated woodpeckers and

flickers) to excavate the cavities they use. Different forest structures are used for nesting (more vertical diversity) versus foraging and roosting (more open understories). These different forest types need not be adjacent since boreal owls will fly between distinct patches of suitable habitats to meet various life history requisites.

No surveys have been done for boreal owls in the project area. Stands 4 and 5 are on cool, north and northwest aspects and have large components of spruce and subalpine fir in addition to larch and Douglas-fir (typical of nesting habitat). Stand 10 is a mixed conifer old growth stand dominated by western hemlock with an open understory (typical of foraging habitat). It lies on a westerly aspect but the high, dense overstory maintains a cool microclimate. Stand 4, 5, and 10 range from about 4,000 feet to 4,800 feet in elevation. Elevationally, the project area and immediately surrounding Forest Service land may be too low and warm to provide adequate foraging habitat for boreal owls. Keeler Mountain, at 4,930 feet elevation, is the highest promontory in over a 3 mile radius. The narrow bands of suitable habitat in stands 4, 5, and 10 that lie above 4,200 feet may provide good quality boreal owl habitat but are possibly too small and isolated to be incorporated into a boreal owl nesting territory.

Pileated Woodpecker: Pileated woodpeckers require large, heart-rotted trees for nesting (preferably larch, ponderosa pine, and cottonwood) and rotted, coarse woody material (from a variety of species) for foraging. These features are usually associated with older, mature forests. Because of their large size, pileated woodpecker nest trees are usually at least 20 inches dbh. Cavities excavated by pileated woodpeckers are used in subsequent years by many other species that require tree cavities but do not excavate their own (such as flammulated and boreal owls).

Nesting and foraging habitat for pileated woodpeckers is abundant and well distributed throughout the project area. Larch was recorded in all plots taken in the project area except stand 6, a dry ridge. Large diameter ponderosa pines were recorded in stand 12. Douglas-fir and grand fir are found throughout the project area.

Black-backed Woodpecker: Black-backed woodpeckers are predominantly found in standing dead forests created by stand replacement fires (Hutto 1995). Although such a cover type does not currently exist on the project area, portions of the project area represent potential habitat for this species since the wetter north and west aspects are prone to high severity, stand replacement fires. Additional foraging and nesting habitats for black-backed woodpeckers are also in older lodgepole pine forests with high densities of bark beetles and heartrot (Goggans, et al. 1989). Stands 7, 8, and 9 are predominantly mature but healthy lodgepole pines that do not currently support high densities of bark beetles.

Lynx: Throughout North America, lynx distribution and numbers are strongly correlated with their primary prey, snowshoe hares. At the lower latitudes of lynx distribution, lynx are found at higher elevations where environmental conditions are more similar to the boreal forests of Canada and Alaska. Within these forests, lynx habitat in western Montana appears to consist of a mosaic of two structurally different forest cover types: early successional coniferous forests that contain high numbers of snowshoe hares for foraging and late successional forests with large amounts of downed woody debris to provide thermal and security cover for kittens.

The east half of the project area is generally unsuitable for lynx. It is a relatively dry, open mountain forest (poor habitat for snowshoe hares). The west and north aspects in the project area (in the Keeler Creek drainage) are cooler and more boreal forest-like, particularly stands 4, 5, and 10. Stand 10 in the project area is a mesic, old stand with old growth characteristics (including large downed woody material suitable for denning habitat). Approximately 10 acres of blowdown in stand 4 may provide existing denning habitat. The utility of denning habitat may be affected by the proximity of foraging habitat. The project area currently does not contain early successional coniferous forest but approximately 19 percent of Forest Service land in the Keeler Creek drainage within a 2 kilometer radius of stand 10 is in a 17-21 year-old regeneration unit cover type.

D. BIG GAME

Four species managed as big game by MT Fish, Wildlife, and Parks utilize the project area during some or all of the year: moose, mule deer, elk, black bears.

Moose: Although evidence of moose was not observed in the project area, moose are widely distributed throughout northwest Montana and would be expected to use the project area during the summer and autumn. Moose generally prefer more mesic habitat types. The east half of the project area is probably too warm and dry for moose. The west half of the project area is more mesic. Because of its relatively high elevation (compared to elevations along Keeler Creek) moose would not be expected to winter in the project area. Extensive browsing on maple, a preferred browse species, was not noted in Stands 7 and 8 where maple was locally abundant. Moose often select thick, higher elevation sites for calving, presumably as a strategy to avoid predators (Langley 1990). Stands 1, 2, 4, 5, and 10 provide the most understory cover in the west half of the project area. With their relatively long legs and large body size, moose are less affected than elk or mule deer by structural changes in habitat which affect factors such as snow depth and thermal cover. Also, control of moose hunter harvest by a permit system mitigates some of the access concerns that are prevalent with elk. For motorized access, the existing environment and affects assessments for elk will also be considered a conservative estimate for moose.

Elk and Mule Deer: Mule deer use the project area throughout the year. The west half of the project area is a transition area for elk as they move out of the Upper Keeler Creek/Spruce Lakes summer ranges onto the east half of the Keeler Mountain Project Area for winter. The east half of the project area provides winter range for both mule deer and elk (Jerry Brown, MT FWP, pers. comm.).

Habitat effectiveness and security are the primary big game concerns in and around the project area. Simple models for habitat effectiveness and security have been developed for elk. Their applicability for mule deer is unknown but assumed to be a conservative measure of the effects of disturbance on that species.

A Habitat Effectiveness Index has been developed to quantify the displacement effects that open roads, livestock, hiding and summer thermal cover have on elk use on their summer range. Open road density has the greatest effect on the H.E. value. The Habitat Effectiveness Index is defined as the percentage of available habitat that is usable by elk during the spring-fall period, but outside of the hunting season and is derived using tables and graphs provided by Lyons (*in:* USFS 1993). Both project and landscape levels are appropriate scales of analyses. The primary value of the H.E. Index is to allow a comparison of an existing environment with various proposals. The project level analysis area is the Keeler Mountain Timber Sale Project Area, 640 acres. The landscape analysis area should approximate the home range of herd Units - perhaps 30,000-150,000 acres (Christensen et al. 1993). Bear Management Unit 03 (76,160 acres) is used for the landscape level assessment of Habitat Effectiveness. At both scales of analysis (the project area and throughout BMU 03) cattle are absent, hiding cover is greater than 40 percent, and summer thermal cover exceeds 15 percent so there are no deductions in Habitat Effectiveness for these variables. Within the 640 acre project area, the Open Road Density is 0.0 miles per square giving a Habitat Effectiveness of 100%. Within BMU 03, the open road density is 0.59 miles per square mile, which reduces Habitat Effectiveness to 72%.

The Habitat Effectiveness model does not consider important site specific habitats, such as wallows or licks. The project area is relatively dry and no wallows, licks, or calving areas are known. The relatively open ridge in the northeast corner of the project area (stand 3) appears to have a disproportionately high amount of big game use. It is relatively flat (compared to most of the rest of the section) and has a good juxtaposition of forage, cover, and solar exposure. Numerous studies (e.g., Edge et al. 1987, Irwin and Peek 1983) have shown elk to preferentially select gentler slopes. Although less site specific, stands 3, 11, 12, 13, 14 and 17 are important winter range. Conifer encroachment is diminishing the quality of this winter range.

The primary source of elk mortality is hunting which, in turn, is strongly affected by road density. Security areas provide relatively secure habitat for elk during periods of hunting season stress. Security habitat is defined to be at least 250 acres in size, at least 0.5 miles from an open road during the hunting season, provides hiding and thermal cover, and is non-linear in shape (Hillis et al. 1991). Hillis et al. (1991) recommended that at least 30 percent of autumn elk home range be maintained as security habitat. Approximately 79% of the Project Area provide security habitat, while 65% of BMU 03 provides security habitat.

Neither the Habitat Effectiveness Index nor security habitat descriptions account for foot, bike, horseback, nor snowmobile access provided by a network of restricted roads. All of these modes of travel are increasingly popular and, collectively, reduce big game security even where roads are restricted (Lyon and Burcham 1998). The total road density in the Keeler Mountain Project Area is 0.5 miles per square mile. Within BMU 03, the total road density is 2.2 miles per square mile.

Black Bears: Seasonal black bear habitats are found in the project area and substantial use of the west side of the project area by black bears was observed. The east half of the project area is elk and mule deer winter range, which provides a potential source of carrion from winter killed ungulates. The open slopes in the east half of the project area provides early spring grasses and forbs, including bulbous plants such as *Lomatium*. The absence of fire has facilitated the encroachment of conifers into the grasslands, diminishing its value as spring bear habitat. Much of the understory in the west half of the project area, (particularly stands 7, 8, and 9) is dominated by huckleberry, an important late summer and autumn bear food. Behaviorally, black bears are less susceptible to displacement by human activities than grizzly bears. Also, their higher reproductive potential allows black bear populations to sustain higher levels of mortality than grizzly bears. It is assumed that access and habitat management for grizzly bears also provides effective habitat for black bears.

E. RARE OR UNIQUE HABITATS

No rare or unique habitats have been identified in the project area. However, stand 15 contains a plant species, *Allium fibrillum*, identified as sensitive by the Kootenai National Forest.

V. FISHERIES

THREATENED AND ENDANGERED SPECIES

Bull Trout: In Montana, bull trout populations were segregated into 11 restoration/conservation areas. These restoration/conservation areas were delineated based on dams and natural barriers segregating bull trout breeding populations. The Kootenai National Forests houses all or part of 3 restoration/conservation areas: Upper, Middle, and Lower Kootenai River Drainage. The project is planned in the Keeler and Lake Creek basins in the Lower Kootenai River Restoration/Conservation Areas.

The Lower Kootenai River Restoration/Conservation Area encompasses the Kootenai River drainage below Kootenai Falls. This metapopulation is physically separated from Middle Kootenai River population by a dam 3/4 of a mile upstream from the mouth of Lake Creek. The location of this dam may have been a natural barrier. The Lower Kootenai drainage flows into Idaho and British Columbia, Canada. In the headwaters of the southern most area of this drainage is comprised of a disjunct population. Meaning, this population appears to be self-reproducing but is functionally isolated from the rest of the system (TMBTSG 1996). Keeler and Lake Creek are part of this disjunct population.

As part of granting a road use permit, the USFS Kootenai National Forest, Three Rivers Ranger District reviewed a biological assessment for impacts to threatened and endangered species. Concurrence from the USFWS on the impacts to threatened and endangered species is required before implementa-

tion of this project. For a description of affected environments for bull trout and white sturgeon, see this biological assessment (Appendix B).

VI. SOILS

A. GEOLOGY

The sale area is located in Section 36 T30N R34W. Slopes in and around the proposed project area range from moderate along the ridge tops to steep on upper portions of the hillside. Soils in the western and northern portions of the proposed sale area are gravelly silt loam surface layers derived from volcanic ash over very gravelly sandy loams. Soils in the eastern half of the proposed project area are rocky residual soils with very thin surface soils. Slopes on the east face are very steep (60-80% or more). Geology throughout the project area is derived from quartzites, siltites and argillites of the Precambrian Belt Supergroup overlain by volcanic ash and glacial till in the western and northern portions of the state section. Geology on the east face of Keeler Mountain is the same as that in the rest of the state ownership, but there is no glacial till, and very thin surface soil. Potential for slope instability exists in the soil types on the north face of the project area. There are no existing soil mass movements identified in or around the project area, and no evidence of historic slope failures.

B. SOIL TYPES

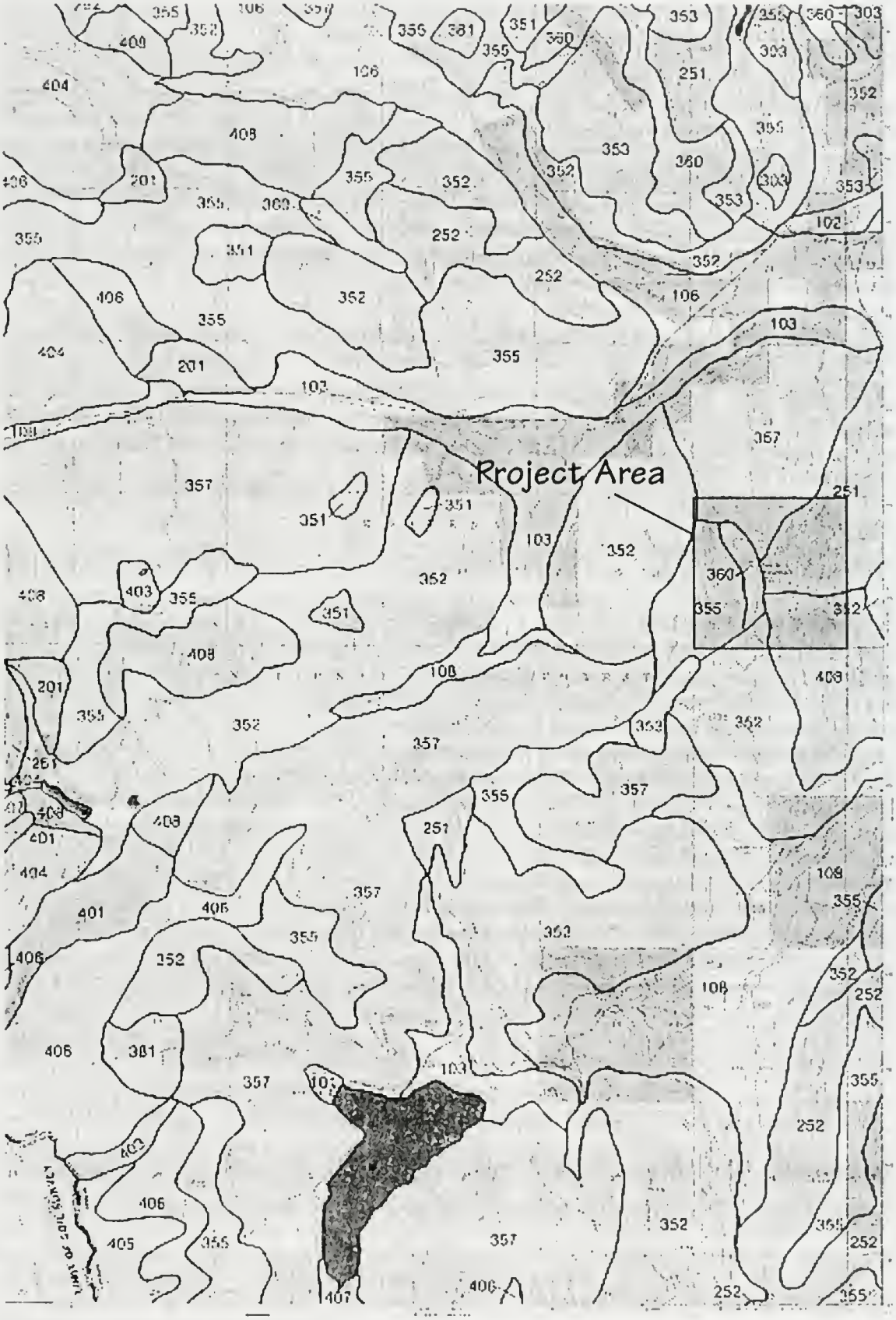
There are five primary landtypes found in the proposed project area (see Figure 3-9 for Soil Map). Each is briefly described below.

- LT 251 consists of residual soil weathered from argillite, siltite and quartzite from the Belt supergroup. This landtype also has a silt loam surface soil 4-14 inches thick. Slopes range from 60-80% or more on mountain sideslopes, with frequent rock outcrops and steep draws.
- LT 355 is a gravelly silt loam topsoil 7-20 inches thick over a very gravelly very fine sandy loam subsoil. This landtype is a dense, brittle glacial till found on glaciated mountain sideslopes. Slope ranges from 20-50%. Potential problem with windthrow of trees on this landtype exists due to the dense layer of glacial till below the surface soil.
  LT 357 has a silt loam surface soil of volcanic ash-influenced loess 4-14 inches thick over a very stony silt loam subsoil. The subsoil is composed of unconsolidated glacial till on mountain sideslopes with slope ranging from 30-60%. Competition with brush may hinder regeneration efforts. This landtype may be prone to landslides, particularly in draws where ground is disturbed.
- LT 360 consists primarily of shallow soils and rock outcrops on mountain ridgetops. Where shallow soils occur, they are gravelly silt loams, 7-12 inches thick over a 5-15 inch thick very gravelly sandy loam. Bedrock occurs in this landtype at 12-20 inches, and timber productivity is very low. Slopes are gentle (15-35%), and are well suited to ground based timber harvest systems.
- LT 408 consists of residual soil weathered from argillite, siltite and quartzite from the Belt supergroup that may be overlain by a thin layer of glacial till. This landtype also has a silt loam surface soil 7-18 inches thick. Slopes range from 60-80% or more on mountain sideslopes, with frequent rock outcrops and steep draws.

CUMULATIVE EFFECTS TO SOIL PRODUCTIVITY

The proposed project area has not been harvested in the past. When the Keeler Mountain lookout tower was constructed, some trees may have been removed from the mountain top to allow visibility,

FIGURE 3-9 SOIL MAP



but no timber management has occurred on the state section so there are no cumulative effects to soils from past practices.

VII. ROADS

Roads to access the section are low to moderate standard, and lack adequate surface drainage features. The main access route from the north contains sustained grades of 12-18 percent with few surface drainage features, many of which are not properly functioning. There are existing cut slope failures on this road in section 35, which fail each year, filling the ditch and routing sediment to a nearby creek. The existing road to the lookout crosses the south section line of section 36. This road has reaches approaching 22% with no surface drainage features. This lookout access has a fill slope failure approximately 3/4 mile from the lookout, which has made the road impassable except by ATV or bicycle. There are no other existing roads in the project area.

VIII. NOXIOUS WEED MANAGEMENT

There are existing outbreaks of spotted knapweed and common St. Johnswort in areas near the proposed project area. These outbreaks are currently limited to roadsides and road beds and do not yet reach into the State section. Spotted knapweed and common St. Johnswort are found along cut and fill slopes of the South Fork Keeler Creek road.

IX. WATERSHED

PHYSICAL DESCRIPTION

The proposed project area is located in Section 36, T30N R34W near the town of Troy, Montana. Several first and second order watersheds drain the proposed sale area. Four of the drainages affected by the proposed project, called watersheds A, B, C and D for the purpose of this analysis (see Appendix D), are tributary to the South Fork and Main Stem of Keeler Creek. The South Fork Keeler Creek is a third order tributary to Keeler Creek, and Keeler Creek is a fourth order tributary to Lake Creek and the Kootenai River. Land within the Keeler Creek watershed is primarily owned by the US Forest Service, and has its headwaters originating in the Idaho panhandle. The remainder of the proposed sale area on the east and south flanks of Keeler Mountain are drained by several first order face drainages. This side of the mountain has a series of bedrock draws on 60% gradients. These draws do not have defined channels, and only flow during snowmelt periods in the spring. All of these first order drainages go subsurface before the Lake Creek road. There is no surface delivery from these streams into Lake Creek. Precipitation in and around the proposed sale area ranges from 40 inches annually at Lake Creek to 90+ inches in the higher elevations.

Watershed	Acres	Channel Stability
B	430	N/A*
C	126	Excellent
D	397	Excellent

* The length of this draw was surveyed by DNRC personnel, and no scoured channel was found, and all evidence of a defined draw disappeared before reaching the S. Fork Keeler.

DNRC personnel gathered channel stability data in summer 1997 on watersheds C and D. Watershed B, which drains the west portion of the state section, had no definable channel throughout any of its length, so stability criteria were not applicable. The other two draws were ranked with excellent channel stability with little or no evidence of erosion or deposition. The remaining watersheds in the proposed project area had no channel stability data gathered since there was either no definable draw or channel within the proposed project area (watersheds A, H, and I), or because the stream goes subsurface and does not deliver surface water to another creek or lake (watersheds E, F, and G).

B. REGULATORY FRAMEWORK

1) Montana Surface Water Quality Standards: This portion of the Kootenai river drainage, including Lake Creek, Keeler Creek and all of their tributaries, is classified B-1 by the Montana Surface Water Quality Standards. Among other criteria for B-1 waters, no increases are allowed above naturally occurring levels of sediment, and minimal increases over natural turbidity. Naturally occurring includes conditions or materials present from runoff on developed land where all reasonable land, soil and water conservation practices (commonly called BMPs) have been applied. Reasonable practices include methods, measures or practices that protect present and reasonable anticipated beneficial uses. These practices include but are not limited to structural and non-structural controls and operation and maintenance procedures. Appropriate practices would be applied before, during, or after all proposed management activities.

2) Water Quality Limited Waterbodies: The main stem of Keeler Creek is named on the 1996 list of water quality limited streams(303D) by the Montana Department of Environmental Quality (DEQ). The probable source of impairment is listed as silviculture. Waterbodies listed as water quality limited are then prioritized by the DEQ for development of a total maximum daily load (TMDL). Keeler Creek is not listed in the top ten waterbodies for TMDL development. Until a TMDL is developed for Keeler Creek, House Bill 546 (Montana TMDL Law) states that new or expanded activities which may further the listed impairment may commence and continue provided they are conducted using all reasonable land, soil and water conservation practices (commonly called BMP's).

C. CUMULATIVE WATERSHED EFFECTS OF PAST ACTIVITIES

There has been moderate levels of harvest in and around the proposed sale area in the past. Most of the recent harvesting has occurred on adjacent Kootenai National Forest land. The only timber harvesting that has taken place within the state section took place several decades ago when the lookout was constructed on Keeler Mountain when some trees may have been removed to allow for visibility from the lookout. The following table shows the current levels of activity in the watersheds with a defined draw or channel, including road construction and timber harvesting.

Watershed	Watershed Acres	Acres of Past Harvest	Existing ECA[1]	Allowable ECA[2]	Miles of Existing Roads
B	430	74	43	194	2.9
C	126	0	1	57	0.3
D	397	18	10	179	0.7
South Fork Keeler	3533	879	335	883	11.4

[1] ECA estimate includes acreage in roads

[2] Allowable ECA for watersheds B, C and D was set based on an 18% allowable increase in water yield. This value is a result of excellent channel stability, or lack of a defined channel, which means that there is a high capacity for water yield increase before impacts to the stream channel may appear. The threshold for the S.F. Keeler was set conservatively at 10% due to the presence of bull trout spawning habitat.

The entire Keeler Creek watershed was looked at to determine possible cumulative impacts of past harvesting in the drainage. The watershed is 31,085 acres, and has had a total of 2,535 acres of timber harvest up to the present. This level of harvesting shows that approximately 8.2% of the watershed is in a harvested condition, and far less is actually in ECA since old units are in various stages of revegetation and recovery. In general, a stream channel will not begin to show a response to water yield increases below an 8 to 10% increase in water yield. This level of water yield increase is reached when the ECA in a watershed reaches 25%.

A detailed quantitative analysis of the cumulative effects of past activities was not conducted for watersheds E, F and G on the east face of Keeler mountain for the following reasons: 1) all of the channels are highly stable where a defined channel exists, 2) all evidence of a channel disappears at least 200 feet from Lake Creek, so no impacts, direct, indirect or cumulative, are carried to that stream, 3) none of these draws delivers surface water to Lake Creek, and 4) there has been no past harvesting in these watersheds. A detailed quantitative analysis of watersheds A, H and I was not conducted because none of these watersheds has a defined stream channel or a definable draw in any portion of the project area.

D. WATER QUALITY

The primary impacts to water quality in the proposed project area are related to the existing road system. A moderate standard road has been constructed by the Kootenai National Forest to access past logging units in the South Fork of Keeler Creek. The road passes through watersheds B, C and D on Forest Service land below the state section. The road is constructed on a steep grade (generally 12-14%), with some reaches approaching 18%. There are few surface drainage features installed on this main haul route, and with grades this steep, the features which are there do not fully function as designed. The draw crossings are also constructed with steep approach grades, and have direct delivery of surface and ditch runoff to the draws. A cutslope failure on west approach in the west draw has led to substantial sediment delivery to the crossing. Some minor remediations have been installed at the site, but they have not been successful in stabilizing the failure or in trapping sediment.

X. VISIBILITY FROM KEELER MOUNTAIN LOOKOUT

Keeler Mountain has been used as a fire lookout on a regular basis since the 1930's. In 1963 the USFS constructed the existing lookout tower. This tower is used on a regular basis when the fire danger risk is high. The lookout provides important visibility to the Cabinet Mountain range, the West Cabinets and the Bull Lake Valley.

Since the construction of the lookout in 1963 the timber surrounding the lookout has grown considerably in height. The visibility from the lookout to the south east and overlooking the Bull Lake area is slowly being compromised. A request from the USFS to cut some of the trees that are obstructing the views from the lookout has been made. Coordinating the removal of these trees in conjunction with this timber sale would be beneficial to both the USFS and DNRC.

XI. VISUAL RESOURCES

METHODOLOGY

The visual characteristics of the Keeler Timber Sale are described as viewed from the primary access routes, Highway 56 which is 2 mi. east of the sale area and from Bull Lake which is 2.5 mi. southeast. The center of section 36 essentially sits on the peak of Keeler Mountain and since the peak is actually a ridge that runs north and south, the proposed sale area is divided nearly in half with one half facing west and the other facing east toward Hwy 56. The area is described in terms of Foreground which is the nearly flat land from the viewing point across the valley to the base of the mountains adjoining the Lake Cr. valley, app 0-2 miles from the viewer; Midground, which are the nearby mountains, including Keeler, extending from 2-3 miles; and Background which includes the visible mountainous terrain behind Keeler and extending approximately 3-10 miles from the viewer.

CURRENT CONDITIONS

Keeler Mountain is intermittently visible from Hwy 56 for a distance of about 7 miles and from the north end of Bull Lake. Along the 7 miles of Hwy 56 that the project area is visible, the actual distance from the highway to the project area varies from 2 to 5 miles.

Foreground:

This includes Highway 56, west to the edge of the valley, which is a band approximately 2 miles wide. Ownership within this band is approximately 60% industrial private timber land, 25% National Forest land, and 15% small private. The predominant land use has been timber management. Most of the existing timber is 10' to 75' tall, though there are some older and larger stands as well as some recently cut areas and agricultural or natural openings. Since Hwy 56 is located primarily in the valley bottom, which is broad and nearly flat, the typical view is one of adjacent timber stands with little opportunity to view more than 1/4 mile from the highway. Unobstructed views of the mid and background only occur at a very few locations. Most of these views are transitory and will change through time as existing stands grow taller or are harvested.

Mid-ground:

Keeler Mountain and the adjacent ridges are steep and rugged mountains extending 1500' to nearly 3000' above the valley floor. They have shallow soils and numerous rocky areas and outcrops resulting in numerous natural openings surrounded by timber as illustrated in Figure 3-10. Several timber-

harvesting units are also visible. Ownership is predominantly National Forest with some State and industrial private land as well.

The mid-ground is also visible from the north end of Bull Lake however, it is at an oblique angle resulting in a very limited view.

FIGURE 3-10: View From Highway 56

Background:

This area is almost entirely National Forest land and is comprised of higher mountainous terrain extending to the Idaho border. It is largely timbered but some openings exist including the Asarco mine, some road cuts and previously harvested units. As noted above, the mid and background are visible only from a few locations along Highway 56.

XII. AIR QUALITY

Federal, State and local agencies enforce rules for open controlled burning. Air quality is analyzed by estimating emissions from prescribed burns and determines which roads would have road dust created by project activity vehicles.

The area analyzed for air quality, which includes all of Lincoln County, is located in Montana Airshed 1.

XIII. ECONOMICS

Demand for timber from a seller perspective in the Northwest region of Montana Flathead, Lake, Lincoln and Sanders Counties) is fair and the future is uncertain. The estimated stumpage value today (2/99) for this project has dropped over 20% from last year's estimate.

Past Costs and Revenues from the DNRC's Forest Sale Program

DNRC does not have a formal accounting system to track costs for individual projects from start to finish. An annual cash flow analysis is conducted on DNRC's forest product sales program. Revenue and costs are calculated by land office and state wide. The revenue-to cost ratios are a measure of economic efficiency. A ratio value less than 1.0 means that the costs are higher than the revenues (losing money). A ratio greater than 1.0 means revenues are higher than the costs (making money). A ratio equaling 1.0 means that the costs equal the revenues. The revenue-to-cost ratios for the Northwest Land Office for fiscal year 1994 was 3.33, 2.41 for 1995, 1.51 for 1996, 1.52 for 1997 and 1.58 for 1998.

Total revenue is revenue from timber sales, permits, Forest Improvement and road maintenance; total cost is the sum of timber operating and general administration costs.

TABLE 3-6: THE NET RETURN/TOTAL REVENUE AND REVENUE/COST RATIOS (TIMBER SALE ACCOUNTING SUMMARY — FY95 & REVISED FY94 MEMO, FY96,FY97, FY98.)

	Total Revenue/Total Cost Ratio				
	FY94	FY95	FY96	FY97	FY98
Northwest Land Office	3.33	2.41	1.51	1.52	1.58
Total Program	2.68	2.07	1.68	1.89	1.72

CHAPTER 4
ENVIRONMENTAL EFFECTS

I. INTRODUCTION

Chapter 4 describes the environmental effects of each alternative on the resources described in Chapter 3 and provides the basis for the summary of environmental effects table at the end of Chapter 2. Cumulative effects from past management and other known disturbances are discussed in this chapter. Direct, indirect and cumulative effects on the resources being analyzed were considered. An economic analysis is also presented. Appendix A, lists proposed mitigation's common to all action alternatives.

II. PROJECTS UNDER CONCURRENT CONSIDERATION

The cumulative effects of past activities are discussed in Chapter III. The related projects under concurrent consideration in the Keeler Mountain Timber Sale area are the USFS Spar Lake Analysis area. The Spar Lake Analysis area is an 85,000 acre area that surrounds the Keeler Mountain (Appendix C). The Spar Lake project is very early into the planning process. The development of the action alternatives has not evolved enough detail for the completion of a quantitative cumulative effect assessment. To the best of our ability, the connected actions of the Spar analysis project are evaluated in the context of this cumulative affects assessment.

III. CURRENT FOREST CONDITIONS – DIRECT INDIRECT AND CUMULATIVE EFFECTS

A. HABITAT TYPES

Habitat Type B and Non-forested Areas:

None of the areas in HTG or the non-forested areas will be treated due to the shallow soils and severe limitations of reforestation.

Habitat Type Group D (Warm and Moist):

All of the proposed action alternatives propose to harvest 85 acres within this HTG. Fifty-three acres (stand 7, 8 & 9) of densely stocked lodgepole pine would receive a clear-cut with reserve treatment. The reserve trees would be the more fire resistant larch and Douglas-fir that would be left in clumps or feathered along the edges. Thirty-two acres (stand 1) would receive a seedtree with reserve treatment. The desired seedtrees will be the more fire resistant larch. Both of these proposed treatments are meant to emulate a high intensity fire and the resulting stands are expected to be the early seral tree species that show resistance to root diseases.

Habitat Type Group E:

Alternative 2 proposed to treat 29 acres (stand 5) of this HTG with a clear-cut with reserve treatment. The reserve trees will be the more fire resistant larch species along with 6-10 snags/acre for wildlife habitat. This treatment is meant to emulate a high intensity wildfire. The desired regeneration will be a mixture of early seral species (larch, ponderosa pine, white pine) that show resistance to root diseases.

Alternatives 3 and 4 proposed to treat the same 29 acres as Alternative 2 plus and additional 88 acres (stands 11 and 13) of group selection harvest treatment on the east face of Keeler Mountain. The group selection harvest treatment is meant to emulate a moderate fire regime where the fire crept on the ground and torched intermittently creating small holes in the canopy. This treatment is meant to reduce stocking levels, capture mortality, increase stand vigor and provide an environment for the reproduction of early seral species.

Habitat Type Group H:

Alternatives 3 and 4 propose to treat 230 acres (stand 12 and 14) in this HTG. These acres would receive a group selection harvest treatment on the east face of Keeler Mountain. This treatment is meant to emulate a mixed fire regime that would have torched intermittently across the landscape thinning the least fire resistant species and creating holes in the canopy for the regeneration of early seral species. This treatment is meant to reduce stocking and provide for the reproduction of early seral species.

B. PATCH CHARACTERISTICS

Alternative 1 (No Action)

- Patch configuration would remain unchanged over the short term.
- Over the long term, patch size and shape may change very slowly, and this is only in the absence of additional disturbance.
- Patch size is currently considered smaller than what would have been characterized historically for the Bull Lake Valley.

Alternative 2

- Patch shapes will be designed to be irregular in shape in an attempt to emulate natural disturbance patterns.
- Where possible, proposed harvest units are positioned adjacent to pre-existing patches in an attempt to blend patch openings to natural landscape patterns and avoid the fragmentation of the landscape purely because of ownership lines.
- Individual trees and clumps of trees will be retained along unit boundaries to create patches that better emulate natural disturbance patterns.

Alternatives 3 and 4

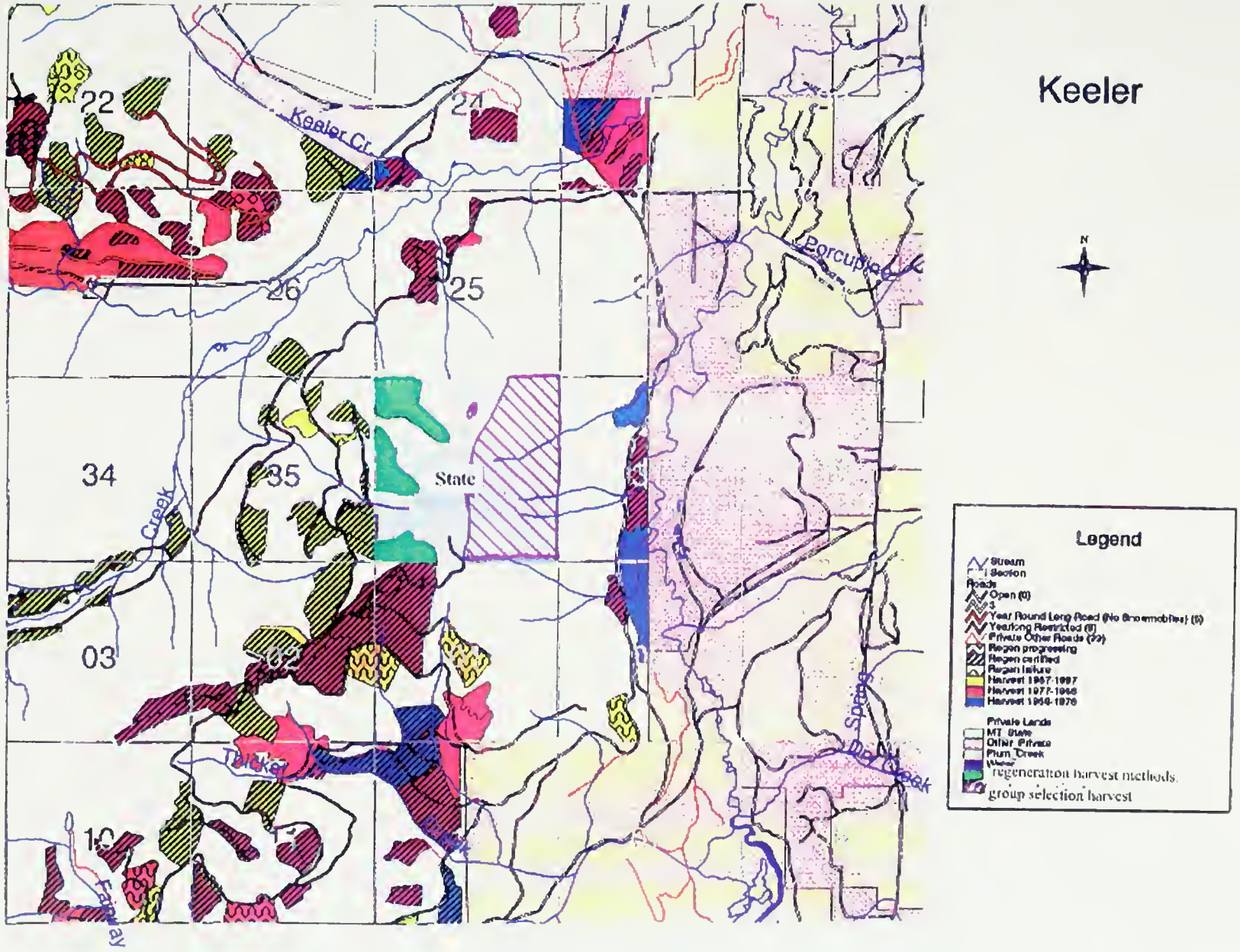
- Harvest unit patches were designed using the same criteria under Alternative 2.
- The large group selection harvest treatment will not effectively change the patch shape, it will merely change the stocking density within the existing patch size and shape.
- Timber harvest activities will be feathered along property boundaries to avoid fragmentation due to different ownerships.
- Figure 4-1 shows patch sizes created for all action alternatives.

C. COVER TYPE REPRESENTATION

Alternative 1 (No Action)

- Within the project area, Libby Unit and the surrounding Kootenai National Forest lands the cover type representation would not change over the short term.

FIGURE 4-1: PATCH SIZES CREATED FOR ALL ACTION ALTERNATIVES



- Over time, lacking substantial disturbances such as wildfire, timber harvesting or major pathogen outbreak, shade tolerant species would continue to grow under existing canopies. Vegetation patterns would shift from early seral species such as western larch and ponderosa pine to late succession shade tolerant species.
- Stocking densities would generally increase and additional competition, mortality, insect infestations and disease infestations would reduce stand vigor.
- Mature stands would become more multi-storied as the current overstory dies and is replaced by patches of regenerated shade-tolerant species.

Alternative 2

Under Alternative 2, 114 acres would be harvested using regeneration harvest methods. Of this 114 acres, 61 acres (Stands 1 & 5) would target converting the shade tolerant cover types (mixed conifer and alpine fir) to western larch/Douglas-fir cover types. Approximately 53 acres of lodgepole pine cover type would be converted to a western larch/Douglas-fir cover type. The inventory data for Libby Unit shows that the western larch/Douglas-fir cover type was the most under represented cover type and that the mixed conifer type was the most over represented covertype. Each action alternative moves the forest in the direction of appropriate conditions for covertype representation by increasing the western larch/Douglas-fir covertype. The summary of covertype representation by alternative for the project area and for Libby Unit is shown in Tables 4-1 and 4-2.

TABLE 4-1 SHOWS THE CHANGES IN COVER TYPE REPRESENTATION FOR ALL ACTION ALTERNATIVES.

TABLE 4–1 PROJECT AREA

COVER TYPE	CURRENT	APPROPRIATE	ALTERNATIVE 2	ALTERNATIVE 3 & 4
AF	103	0	74	74
DF	40	40	40	40
LP	68	43	15	15
MC	115	42	83	43
WL/DF	278	478	392	443
NF	36	36	36	36

TABLE 4-2 LIBBY UNIT

COVER TYPE	CURRENT	APPROPRIATE	ALTERNATIVE 2	ALTERNATIVE 3 & 4
AF	188	47	159	159
DF	1278	1308	1278	1278
LP	1568	1083	1505	1505
MC	4222	833	4190	4150
PP	11241	11878	N.C.	N.C.
WL/DF	10205	14214	10319	10370
WWP	241	325	N.C.	N.C.*

* N.C. means No Change.

Alternative 3 & 4

Alternatives 3 and 4 would treat the same stands as Alternative 2, plus an additional 318 acres using a group selection harvest treatment and 10 acres of salvage harvest. The 318 acres group selection harvest-area is composed of 277 acres of the western larch/Douglas-fir cover type 41 acres (stand 11) of the mixed conifer type. This treatment would target harvesting the late successional shade tolerant species and create openings that would be planted with early seral species. On the lower elevations, ponderosa pine would be inter-planted and on the upper elevations larch would be inter-planted. This alternative increases the western larch/Douglas-fir cover type by 41 acres and reduces the mixed conifer representation by 41 acres. The objectives of this treatment are to reduce the encroachment of shade tolerant species; encourage the reproduction of early seral species; reduce stocking densities; capture mortality and increase stand vigor.

There is a ten-acre patch of blow down timber (Stand 4) that would receive a salvage harvest treatment to capture the mortality, and reduce the chance of insect infestation.

D. AGE CLASS DISTRIBUTION

Alternative 1 (No Action)

Under Alternative 1, age class distributions or old growth amounts would not immediately be affected. However, over time in the absence of disturbance, old growth and older-age stands would increase their representation.

Alternative 2

Alternative 2 would convert 82 acres (stands 5, 7, 8 & 9) of the 40-99 year age class to the seedling/sapling age class through even age harvesting. Thirty-two acres (stand 1) of the 100-149 age class would be converted to the seedling/sapling age class. No harvesting of old growth would occur under this alternative.

Alternatives 3 & 4

Alternatives 3 and 4 would convert the same 114 acres of pole and mature timber to the seedling/sapling age classes. In addition to this treatment, 318 acres of pole and mature age classes would be treated using group selection harvest methods and 10 acres would receive a salvage treatment.

TABLE 4-3: KEELER MOUNTAIN PROJECT AREA

KEELER MOUNTAIN PROJECT AREA				
AGE CLASS DISTRIBUTION POST HARVEST				
AGE CLASS	NO ACTION		ACTION ALTERNATIVE	
	%	Acres	%	Acres
1-40	0	0	18.8	114
40-99	82.0	498	68.9	416
100-Old Growth	7.1	43	1.8	11
Old Growth	10.4	63	10.4	63

TABLE 4-4: UNIT LIBBY

UNIT LIBBY				
AGE CLASS DISTRIBUTION POST HARVEST				
AGE CLASS	NO ACTION		ACTION ALTERNATIVE	
	%	Acres	%	Acres
1-40	11.6	3458	12.0	3512
40-99	38.9	11593	38.6	11511
100-Old Growth	32.3	9631	32.0	9549
Old Growth	17.5	5208	17.5	5208

The group selection harvest and salvage treatment is not expected to change the stand age immediately. Over time however, an understory component would develop a multi-aged and multi-storied stand.

The effects of each alternative on the age class distribution for the project area and Libby Unit lands are shown in Tables 4-3 and 4-4 respectively.

E. OLD GROWTH

Alternative 1 (No Action)

- The amount of total old-growth on stands on Libby Unit and the project area would remain the same in the short term. Overtime, there would be change in cover type as plant succession continues.
- The amount of large live trees in existing old-growth stands would likely stay the same for the short time and decrease overtime through mortality.
- The amount of large coarse woody material on the ground in old-growth stands should increase overtime as more large tree mortality takes place.
- The combination of increased stocking densities, mortality, and overall stand age should lead to a reduction in stand vigor, an increase in the decadence of old-growth stands and an increasing risk of stand replacement fires within the project area and Libby Unit Lands.

Alternatives 2, 3 and 4

Under the action alternatives there would be no harvesting of old growth. The ID team felt that since the project area was surrounded by USFS lands and the USFS has an obligation to manage for old growth, this would be an appropriate location to manage for old growth. For the short term, in the absence of disturbance the old growth representation on Libby Unit lands and the project area and vicinity will go unchanged.

Also under the action alternatives there will be no harvesting of mature timber that has connectivity to USFS old growth timber.

F. OLD GROWTH REPLACEMENT STANDS

Effects common to all Alternatives

There are adequate timber stands in each covertype to meet DNRC's Old-Growth recruitment schedule.

G. REGENERATION POTENTIAL

Alternative I

Under this alternative no timber harvest will occur. Any future regeneration will be of late succession tree species that will bring current forest conditions further away from desired future conditions.

Alternatives 2, 3 and 4

Proposed treatment areas will include the use of regeneration harvests in order to convert affected areas and move them towards the desired future condition. The harvest openings would be planted or seeded naturally to create a diverse community of plants and trees. The survey results of surrounding

harvest areas within similar habitat type groups and land types demonstrate assurance that these sites can be adequately restocked.

H. PROPOSED, THREATENED, ENDANGERED AND SENSITIVE (PTES) PLANTS

Through a PTES field survey of the project area, one Montana plant species of special concern was found in the project area. This is the fringed onion (Allium Fibrillum).

Alternative 1 (No Action)

- If the No Action Alternative were chosen no new negetative effects to the fringed onion would be expected in the short term.
- In the long term, parts of the fringed onion population may be threatened by suppression of lightening fires on the mountain top. This may result in regeneration of conifers in some areas of the onion habitat concomitant creation of new openings for replacement habitat. Some older openings may also be prone to domination by grasses, which preclude both conifers and the fringed onion. The onion may also be affected in smaller ways by factors affecting populations of animals on the mountain, such as bears and rodents. The fringed onion is adapted to a specific niche in a dynamic, patchy ecosystem and may ultimately be threatened by land management, which interferes with this spatial and temporal complexity (Vanderhoist pers. comm.).

Alternatives 2, 3 and 4

The population of fringed onion located in the project area is located on open ridge tops and mountain meadows. None of the proposed road building or ground disturbing logging activity will directly affect the areas where the onion exists. All population areas have been ribboned off and will constitute equipment exclusion areas. The chance of negative impacts to the onion population is primarily due to the possible introduction of weeds to the project area from increased access of motorized vehicles.

The ground disturbance and canopy removal related to management activities (e.g. logging and road construction) may favor the onion in some situations provided weeds are not introduced (Vanderhoist pers. comm.). Given this plant appears to increase with disturbance it is unlikely wide spread negative effects to the population would occur; there may actually be an increase in plants over time.

All proposed action alternatives propose to gate the road leading into the project area after logging is completed. If Alternative 4 is chosen and the USFS decides to acquire permanent access to the lookout, some additional long term road use activity to the project area will result.

The mitigation measures outlined in the noxious weed section and post project monitoring should protect the area from possible weed introduction.

IV. WILDLIFE

Coarse Filter Assessment

To complete this assessment the vegetation analysis discussed earlier in this Chapter was used. The cumulative effects analysis uses the Libby Unit. Under Alternative 1, no changes in patch size would occur, while shade tolerant cover types, stand age, and canopy closure would increase. These changes

would benefit species associated with these habitat types. As stand age increases the presence of decay, snags, and downed material also increases, thus benefiting cavity nesting species and species associated with older forests. On the Libby Unit, habitats for the above species groups would increase and contain to be over represented when compared to the 1930's data.

All the Action Alternatives change the amount of cover types on the landscape. Under Alternative 2, conversion from MC, SAF, and LPP to WL/DF would occur on 114 acres. This change would benefit species that favor a more open canopy, higher herbaceous understory, and/or WL and DF trees species to provide important functions in their life cycles at the expense of species that require closed canopies and/or MC, SAF, and/or LPP tree species for habitat. Under Alternatives 3 and 4, an additional 51 acres of MC, SAF, and/or LPP would be converted to WL/DF with the above effects expected. Also, under these Alternatives, 278 acres of WL/DF habitat would be treated to maintain the cover type in the stand. This would perpetuate species using this habitat in the area into the future. All Action Alternatives move the project area in the direction of appropriate cover type in the project area and the Libby Unit, thereby producing an assumed beneficial effect on native species in the area.

All the Action Alternatives decrease the average stand age class. Under all Action Alternatives, 82 and 32 acres would be reduced from 40-99 and 100-149 age classes, respectively, to the 1-39 age class. This conversion would reduce habitat for species that need trees for use in their life cycles (breeding, survival, etc.) until second growth is reestablished, while increasing habitat for species associated with open habitats. Some of these impacts may be mitigated by retaining all existing snags (excluding snags deemed as safety hazards) and adequate snag recruits. These structural features may be used in the short term by species that use more open habitats or in the long-term by species that need cover around nesting and roosting sites as the second growth regrows and provides cover around the snags. Conversion of the 40-99 age class to the 1-39 moves the area towards the average of historic conditions in the climatic region, thereby producing an assumed beneficial effect on the native species in the area. Conversely, conversion of the 100-149 age class to the 1-39 age class moves the area away from the average conditions in the climatic region, but moves the Libby Unit lands toward historic conditions. Therefore, a localize negative effect on native species may occur, but benefits to native species on the Libby Unit may occur.

Under all Action Alternatives, patch size is expected to be smaller than under natural conditions in the project area and on the Libby Unit. This condition would favor species that use a diversity of habitat types and/or edge habitat, while negatively affecting species that require interior type habitats.

Threatened and Endangered Species

Peregrine Falcon:

Effects of the No-Action Alternative: The project area would continue to lack peregrine falcon nesting and foraging habitats. The area would continue to provide whatever purposes it may serve as a migratory corridor.

Effects of Action Alternatives 2, 3, and 4: Nesting and foraging habitats for peregrine falcons are currently absent from the project area and would not be created by any proposed action. The functionality of the project area to serve as a migration corridor would be unaffected by any proposed action. No mortality agents, such as environmental contaminants that could find their way into the peregrine falcon food chain, would be introduced into the environment by any proposed action.

Bald Eagle:

Effects of the No-Action Alternative: Bald eagle foraging opportunities in the east half of the project area would continue a general decline from conifer encroachment on the ungulate winter range.

Effects of Alternative 2: Timber would not be harvested in the east half of the project area. Conifer encroachment and its concomitant effects would continue as described above for the No-Action Alternative.

Effects of Alternatives 3 & 4: Timber harvest and understory burning in stands 11, 12, 13, and 14 would enhance the area as a big game winter range. Opening up the overstory would make carrion more accessible to bald eagles. Large ponderosa pine trees, which could be used for roost or nest trees would be preferentially retained in stand 12. Removing many of the shade tolerant conifers would decrease competition and fuel ladders around ponderosa pines, increasing the likelihood that they would be survive future insect attacks and fires. No environmental contaminants or other mortality agents would be introduced into the project area.

Cumulative Effects: Timber harvest as proposed by Alternatives 3 and 4 would potentially increase habitat quality for bald eagles in the 2.5 mile home range radius.

Wolves:

Effects of the No-Action Alternative: The project area would continue to provide relatively low quality wolf habitat for hunting or pup rearing due to relatively steep topography and the lack of perennial surface water. Foraging habitat would continue to decline as conifers expanded their coverage over the elk and deer winter range. Habitat security would remain high in the project area, however, with no open roads and a total road density of 0.5 miles per square mile.

Effects of Alternative 2: The project area would continue to provide relatively low quality wolf habitat for hunting or pup rearing due to relatively steep topography and the lack of perenniel surface water. Foraging habitat would continue to decline as conifers expanded their coverage over the elk and deer winter range. Security would decrease in the project area as the total road density increased from 0.5 to 1.5 miles per square mile.

Effects of Alternatives 3: Foraging habitat for wolves may improve in the project area as elk and deer winter range is improved by timber harvest and understory burning of stands 11-14. These gains would be marginal, however, since the steep topography inherently renders this winter range of limited value to wolves due to the difficulty of hunting on steep terrain. Security in the project area would be decreased with the building of 1.4 miles of new road, increasing total road density from 0.5 to 1.9 miles per square mile.

Effects of Alternative 4: Effects on wolf foraging habitat would be as described for Alternative 3. Security would be the most reduced in the project area by this alternative as total road density would increase from 0.5 to 2.7 miles per square mile.

Cumulative Effects: The relatively flat, low elevation, riparian associated habitats where USFS roads would be restricted are potentially much better hunting and pup rearing habitats for wolves than in the project area, where total road density would be locally increased. Restriction of USFS roads would improve security for wolves in larger landscape by securing better habitat.

Grizzly Bear:

Since the grizzly bear is a wide ranging species, site specific analysis is less informative than a more comprehensive approach. Therefore, the following analysis focuses on the cumulative effects in the BMU #03 in the Cabinet-Yaak Ecosystem.

Cumulative Effects: The Kootenai National Forest prepared a Biological Assessment (Appendix B) to assess the impacts of DNRC's request for a road use permit and its connected actions (this proposed activity). Following is a summary of findings from Appendix findings.

Habitat effectiveness would be decreased under any of the Action Alternatives. Habitat effectiveness during the project would decline from 75.4% to 74.6% under Alternative 4 (the most disruptive alternative). Following harvests, the road system would be gated, thus returning the habitat effectiveness to 75.4%.

The ORD in BAA 3-1 and 3-4 would increase under all action Alternatives. However, the ORD in the BMU would remain under the 0.75 mi/mi^2 standard. The TMARD would not be altered under any Alternative, because the Kootenai National Forest would offset new road construction by allowing the state to recontour (for one sight distance) roads proposed for closure. This is expected to effectively eliminate the use of the closed road by ORV, and hikers. Road closures on the National Forest would be equal to the amount of roads constructed on National Forest and State lands.

The amount of security core areas would not be altered by this project. Presently, 59% of the BMU is in security core area. Any reduction in security habitat by the new road construction would be offset by berming roads on the USFS to secure the lost amount of security core area.

Movement corridors of 600' in width would remain available to bears around the perimeter of the harvest and between stands except in one area. Under all action Alternatives, the movement corridor between stands 2 and 3 necks down to 300' for about 600'. However, movement through the area would not be greatly impaired because adequate movement corridors on either side of stand 2 or stand 3 would be maintained. Hiding cover would be reduced in each unit entered. Cumulatively, hiding cover in the BMU would be reduced by this project and the USFS project 2 miles to north. Hiding cover does not appear limiting on this BMU.

The east side of the project area is suitable for use by bears in the spring. The timing of the projects would avoid the spring use period (1 April to 15 July). This mitigation would deter disturbance to grizzly bears using the area in the spring.

Sensitive Species

Flammulated Owl:

Effects of Alternatives 1 and 2: No timber harvest would occur in stand 12 in either of these Alternatives and fire suppression policies would remain in effect. Continuing conifer encroachment would gradually reduce habitat quality for flammulated owls, which prefer more open understories in mature ponderosa pine/Douglas fir forest types for foraging and nesting. Conifer encroachment and fire suppression increases the risk of an eventual stand replacement fire, which would make the project area unsuitable for flammulated owls for more than a century.

Effects of Alternatives 3 and 4: Approximately half of the existing canopy cover in stands 11 - 14 would be harvested with emphasis on retaining large ponderosa pines and some large Douglas fir trees. Growth rates and vigor of retention trees should increase in response to reduced competition. Snags, which do not pose an unacceptable safety hazard, would be retained. Understory burning in stands 11 - 14 would reduce shrubby vegetation as well as small conifers, opening the understory, as favored by flammulated owls. Regeneration of ponderosa pine would ensure long term viability of the project area for flammulated owls. The road systems proposed by Alternatives 3 and 4 would not affect flammulated owl habitat since the drier sites where pine occurs are at the lower elevations, along the east end of the project, and would not be vulnerable to firewood harvest.

Cumulative Effects: The cumulative effects of projects on the Kootenai National Forest within 1 mile of the project area were considered in this analysis. Regeneration harvests (approximately 204 acres) occurring in Ponderosa Pine cover type on the Kootenai National Forest removed flammulated owl habitat in the short-term. Over time, these harvested stands will regenerate in ponderosa pine and provide habitat. Under Alternatives 1 and 2, no flammulated owl habitat would be modified, however, flammulated owl habitat quality is expected to decrease through time. Under Alternatives 3 and 4, flammulated owl habitat in the Keeler watershed is expected to increase in the short and long term. Stand 5 ties into other patches lower on the slope that may currently provide flammulated owl habitat. By enhancing the stand qualities for flammulated owls, an increase in habitat quality in the analysis area is expected.

Boreal Owl:

Effects of Alternative 1: With the no-action Alternative, timber would not be harvested in the project area and no new roads would be built. In the absence of a stand replacing fire, forest succession would increasingly create old growth characteristics in stands 4 and 5 (as currently observed in stand 10), generally enhancing boreal owl habitat quality in those two stands.

Effects of Alternative 2: Approximately 1.0 miles of new road would be built along the west side of the project area to the east boundary of stand 5. The road, which would bisect the old growth cover type in stand 10 would not, in itself, reduce boreal owl habitat quality or effectiveness. A seed tree type of harvest in stand 5 would eliminate boreal owl habitat. Retention of existing snags and a minimum average of at least 6 larch and Douglas-fir snag recruits per acre would speed recovery of boreal owl habitat quality, providing continued presence of large snags as the new forest developed.

Effects of Alternatives 3 and 4: The effects described for Alternatives 1 and 2 would also apply to Alternatives 3 and 4. In addition, 0.4 miles of road would be built through stand 4 and approximately 10 acres of blown down timber would be salvaged in stand 4. The effect of the additional road would primarily be to facilitate salvage harvests in stand 4, cumulatively degrading old growth characteristics as they developed.

Cumulative Effects: The same analysis area as flammulated owls was used to conduct the cumulative effects of the proposed Alternatives. No other habitat appears to be present in the project area, therefore there are only direct and indirect effects of this project. These effects were discussed above.

Pileated Woodpecker:

Effects of Alternative 1: With the no-action Alternative, pileated woodpecker habitat would persist and improve in the project area. In the relatively wetter west half of the project area (stands 1 - 10, 15, and 16), forests would continue to develop old growth characteristics (in the absence of a stand replacing fire). Increased representation of Douglas fir and grand fir would continue to provide abundant foraging habitat while the existing larch provided nesting habitat. The existing low density of roads in the project area provide the highest level of security for snags against firewood harvest. In the relatively dry east half of the project area (stands 11 - 14 and 17), foraging habitat would increase as Douglas fir and grand fir increased and incurred more rot due to competition. Eventually, however, there is increased risk of losing the large larch and ponderosa pine, which are preferred for nesting, to a stand replacement fire and lack of recruitment.

Effects of Alternative 2: Regeneration harvest would dramatically reduce pileated woodpecker foraging and nesting habitat in stands 1 and 5 which represent about 10 percent of the project area. Retention of existing snags and a minimum average of 6 larch and Douglas-fir snag recruits per acre would speed recovery of pileated woodpecker habitat quality, providing a continued presence of large snags as the new forest developed in these stands. Stands 7, 8, and 9 (approximately 9 percent of the project area)

are predominantly lodgepole pine with an older, larger cohort of larch in the overstory. These lodgepole pine dominated stands are currently marginal feeding habitat although an eventual increase of pine bark beetles would improve that. Regeneration of the lodgepole pine trees and retention of the most of the existing larch would not have a significant impact on pileated woodpecker habitat in the project area. Salvage harvest of large dead or dying western white pine within 2 tree lengths of the new road in stand 10 would not significantly impact pileated woodpeckers since western white pine is not a commonly used tree species for cavity nesters (Parks et al. 1997). The remaining unharvested stands in the project area, about 79 percent of the project area, would continue to provide good pileated woodpecker habitat. The 1.1 miles of new road proposed under this alternative would represent a continual risk that snags would be subjected to firewood harvest if road restrictions failed.

Effects of Alternatives 3 and 4: The same stands and effects as described for Alternative 2 would apply to Alternatives 3 and 4. Additional management would include salvage of blowdown in stand 4, harvest of about 50 percent of the volume in stands 11 - 14, and building of an additional 0.4 miles (Alternative 3) or 1.2 miles (Alternative 4) of road. The removal of blowdown in stand 4 would remove some foraging opportunities for pileated woodpeckers as the wood began to rot and was colonized by insects, but this would not represent a significant loss in this otherwise unharvested stand. Selective removal of shade tolerant species (mostly Douglas-fir and grand fir) would reduce foraging habitat immediately after harvest but may provide for long-term viability of the area by reducing the risk of losing large diameter ponderosa pine and larch trees found in stands 11 - 14 to a stand replacement fire or insect mortality. Although the carrying capacity for pileated woodpeckers may be decreased in stands 11 - 14, they will still provide pileated habitat since large ponderosa pine and larch will be retained throughout the stands and the residual shade tolerant trees will provide foraging habitat. The increased road density in the project area increases the risk that snags along the road corridor will be harvested for firewood if road restrictions failed.

Cumulative effects: The same analysis area as flammulated and boreal owls was used to assess the cumulative effects on pileated woodpeckers. Most of the stands in the area contain grand fir and Douglas fir. Both of these species provide foraging habitat. Additionally, many stands contain ponderosa pine and western larch, which provide nesting habitat. The older stands in the area provide the highest quality pileated habitat due to the insects and rot associated with older trees. Approximately 80% of the analysis area is in the mature or older age classes. Under Alternative 1, foraging habitat in the area would increase, while potential nesting sites would decrease over time, barring a stand replacing fire. Under Alternative 2, 61 acres of pileated woodpecker habitat would be removed from the area. However, the longevity of this loss is expected to be short-term by leaving existing snags and adequate snag recruits to provide the structure needed to support pileateds in a second growth forest. Under Alternatives 3 and 4, foraging habitat would be decreased further in the analysis area; however, nesting sites would be protected from a fire event.

Black-backed Woodpeckers:

Effects of Alternative 1: Under the no-action Alternative, no timber would be harvested and, over time, the project area would be increasingly susceptible to a stand replacement fire which would then create preferred black-backed woodpecker habitat at that time.

Effects of Alternatives 2, 3, and 4: Regeneration-type harvest of stands 1, 5, 7, 8, and 9 would eliminate the fuels to support a stand replacement fire (an event necessary to support black-backed woodpecker populations) for many decades. Mature forest conditions in the remainder of the project area would provide potential black-backed woodpecker habitat in the event of a stand-replacement fire. Even in recently burned forests, black-backed woodpeckers prefer to nest in trees that were already snags before the forest burned (Hutto 1995). Therefore, presence of snag recruits in stands 1, 5 , 7, 8, and 9 may affect the future habitat quality of the stands in the event of a stand replacement fire years after this proposed harvest. Retention of an average minimum of 6 snag recruits per acre in regeneration-

type harvest stands would provide for the presence of large diameter snags in the next forest to develop.

Cumulative effects: The same analysis area used for flammulated owls was used to assess the cumulative effects of this project on black-backed woodpeckers. The harvest stands proposed in all Alternatives (stands 1, 5,7,8 & 9) would further fragment the Keeler drainage, thereby reducing the chance of a large stand-replacing event. This situation would limit the ability of the area to develop suitable habitat for black-backed woodpeckers. Under Alternative 3 and 4, the harvest proposed would reduce the chance of a fire running up the eastside of Keeler Mountain and cresting the ridge. This stand would have limited cumulative effects to black-backed woodpeckers, because the current stand probably would not support a stand replacing fire except in extreme conditions and the ridge would provide a fuel break in a low-medium intensity fire regardless of harvest.

Lynx:

Effects of Alternative 1: Stand 10, which contains many old growth attributes, would continue to provide denning habitat. Mesic mature forests (particularly stands 4 and 5) have the best potential to achieve mesic old growth characteristics in the absence of a stand replacement event because of their northerly aspects. Lynx foraging habitat would remain essentially absent in the project area, although nearby USFS regeneration-type harvest stands would continue to provide foraging habitat for at least several more decades. Security would remain high in the project area with the low total road density.

Effects of Alternatives 2, 3, and 4: Regeneration-type harvest of stands 1, 5, 7, 8, and 9 would potentially create lynx foraging habitat adjacent to stand 10, which currently provides denning habitat, and stand 4, which has good potential for future denning habitat as old growth characteristics develop. Broadcast burning below the proposed road would stimulate a high density of lodgepole pine regeneration, conditions favorable to snowshoe hares, and thus, for lynx foraging habitat. Excavator piling of slash above the road would not regenerate as high of densities of lodgepole pine as in burned area and therefore support lower densities of snowshoe hares. Post harvest commercial thinning of regeneration stands would affect the quality of snowshoe hare and lynx habitat. All action Alternatives would build road through stand 10 and either to, or through, stand 4, substantially decreasing security for lynx in the project area. Road restrictions would not preclude winter use of roads by snowmobiles, which would increase lynx vulnerability to legal, illegal, and incidental trapping.

Cumulative effects: The project area is discontinuous with any other suitable lynx habitat, therefore no cumulative effects from the project area expected.

Big Game

Moose

Effects of Alternative 1: The project area would continue to provide moose habitat as it currently exists - primarily as calving and summer habitat in stands 1, 2, 4, 5, and 10.

Effects of Alternatives 2, 3 , and 4: Summer and calving habitat in stands 2, 4, and 10 would be retained but lost in stands 1 and 5, where most of the forest canopy would be removed. Foraging habitat may increase in the project area, particularly where shrub growth is stimulated by broadcast burning below the proposed road in stands 1, 5, 7, 8, and 9.

Cumulative Effects: Refer to elk cumulative effects.

Elk and Mule Deer:

Effects of Alternative 1: The no-action Alternative would maintain the existing Habitat Effectiveness Index (USFS 1993) of 100% in the project area. The H.E. Index for the project area and the BMU 03 is entirely a function of open road density (0.59 miles per square mile) since hiding and summer thermal cover values and livestock densities are at levels which do not affect the index. In the absence of fire or logging, conifer encroachment will continue to degrade the quality of winter range forage. Security habitat, as defined by Hillis et al. (1991) and described in Chapter 3, would continue to be 79% in the project area. A more inclusive definition of security, which would consider the effect of facilitating human access along restricted roads (Lyon and Burcham 1998) would continue to be high for the project area which would maintain a total road density of 0.5 miles per square mile.

Effects of Alternative 2: Alternative 2 would maintain the existing Habitat Effectiveness Index of 100% in the project area since all new roads would be restricted by gates. Regeneration-type harvest of stands 1, 5, 7, 8, and 9 would eliminate hiding cover in those stands for at least 15 years. Security habitat (Hillis, et al. 1991) would decline to 63% in the project area due to the loss of thermal and hiding cover in the regeneration stands. Security from non-motorized traffic would decrease in the project area with the construction of 0.6 miles of road. Winter range would continue to decline in value as conifer encroachment continued in stands 3, 11, 12, 13, 14 and 17 since no harvest or burning would occur.

Effects of Alternatives 3 and 4: Both Alternatives would maintain the existing Habitat Effectiveness Index of 100% in the project area and 72% in BMU 03 since all new roads would be restricted by gates. As in Alternative 2, regeneration-type harvest of stands 1, 5, 7, 8, and 9 would eliminate hiding cover in those stands for at least 15 years and increase opening sizes where they abut existing USFS regeneration stands. Security habitat (Hillis, et al. 1991) would decline to 39% in the project area due to the loss of thermal and hiding cover in the regeneration stands and a 50% reduction of thermal and hiding cover in stands 11-14. Overall, security would decline in the project area with the building of 1.4 miles of new road in Alternative 3 or 2.2 miles of new road in Alternative 4. Habitat value of winter range would improve with the removal of conifer encroachment and burning in stands 11-14.

Cumulative Effects: Under Alternative 1, the BMU would retain a habitat effectiveness value of 72%. Security habitat in BMU 03 would be maintained at 65%. However, USFS roads would not be closed (with slash) by this Alternative so the total road density in BMU 03 would remain 0.6 miles per square mile. Under Alternative 2, habitat effectiveness would remain at 72% in BMU 03 since, all new roads would be restricted by gates. The western edges of all or portions of stands 1, 7, 8, and 9 would be contiguous with existing regeneration stands on USFS land, cumulatively increasing opening sizes of openings across the two ownerships. This would be offset in the larger landscape, however, with the slashing of equal distances USFS roads. Winter range would continue to decline in value as conifer encroachment continued in the area since no harvest or burning would occur. Under Alternative 3 and 4, the effects of Alternative 2 would occur. The additional road construction would be offset by closing an equal distance of USFS road. Habitat value of winter range would improve with the removal of conifer encroachment and burning in stands 11 - 14.

Black Bears

Effects of Alternative 1: The east half of the project area would continue to provide good quality spring foraging habitat from ungulate carrion, grasses, and forbs. Habitat quality would continue to decline as conifers encroached into the grasslands. Stands 7, 8 , and 9 would continue to provide good autumn foraging habitat, particularly from the huckleberries in these stands. Habitat value in these stands may slowly decline as shrubs become decadent from fire exclusion. Security in the project area would continue to be good since: 1) road density would continue to below 0.75 mi/mi^2 and, 2) the existing

road to Keeler Mountain Lookout does not bisect the autumn foraging areas (huckleberry patches). No USFS roads would be closed with this Alternative so security in BMU 03 would remain as the existing condition.

Effects of Alternatives 2: Habitat values for black bears will be enhanced in the lower third of stands 1, 5, 7, 8, and 9 where regeneration harvest is followed by broadcast burning. In the upper two-thirds of these stands, where excavator piling is the method of slash treatment and site preparation, habitat values will be either the same or less as fire will not be present to stimulate new growth of huckleberry shrubs. Some mechanical damage to huckleberry root crowns is unavoidable. Security in the project area will decline as 0.4 miles of new road is built but will increase in BMU 03 as 1.4 miles of USFS road is closed.

Effects of Alternatives 3 and 4: The same effects as described for Alternative 2 will be present for Alternatives 3 and 4. In addition, spring foraging habitat quality for bears would be improved by removing 50% of the crown cover in stands 11-14 and burning some of the understory. Security within the project area will be further reduced by the building of 1.4 miles (Alternative 3) or 2.2 miles (Alternative 4) of new road. However, overall security in BMU 03 would remain the same with equal amounts of USFS road closures area road construction.

Cumulative Effects: Refer to the grizzly bear cumulative effects section.

Rare or Unique Habitats

No rare or unique habitats have been identified on the project area. Stand 15, in which *Allium fibrillum* (a sensitive plant species) occurs is not included in any Alternatives for either harvest or for conducting harvest related activities, including skidding and road building. The existing road through stand 15 (which accesses Keeler Mountain Lookout) may be improved in Alternative 4 but it would not require new construction that would destroy either *Allium fibrillum* plants or their habitat.

V. FISHERIES

Alternative 1 (No Action): Under the No Action Alternative, no new impacts to fish habitat would be generated beyond those already occurring due to natural processes or past management. Under this alternative, none of the proposed stream crossing replacements, road improvements, or repair of existing sediment sources would be completed with this sale. These problems would continue to recover or degrade as dictated by natural and pre-existing conditions until funding sources become available to repair them.

Alternatives 2, 3 and 4: For a complete description of analysis methods and environmental consequence on threatened and endangered fisheries species (Bull trout and White sturgeon), see Forest Service Biological Assessment in Appendix B. The summary of finding states that: "implementation of the federal action and the connected actions of the Keeler Mountain project "**May Affect – Not Likely to Adversely Affect**" Bull trout and would have "**No Effect**" on the white sturgeon.

VI. SOILS

A. EFFECTS TO THE SOIL RESOURCE

Alternative I (No Action): The No Action alternative would have little effect on soil resources. Existing roads with inadequate drainage would continue to erode without maintenance until additional funding became available to repair them. Existing mass failures would remain in their current condition and

contribute sediment to creeks until they stabilized and re-vegetated naturally. Sedimentation is a soil related impact that is covered in the watershed analysis.

Effects Common to All Action Alternatives: Primary soil concerns are potential rutting, compaction or displacement associated with ground based harvest operations and site preparation. Potential site impacts are difficulty with regeneration, reduced site productivity and increased runoff and erosion. Most sensitive soils are wet sites and steep slopes, which will be avoided or protected by logging system layout.

B. CUMULATIVE EFFECTS TO SOIL PRODUCTIVITY

Alternative 1 (No Action): The No Action alternative would have no effect on cumulative soil impacts. Current conditions in the proposed project area have no past harvest activity or other impact to soil productivity, and the no action would not generate any additional ground disturbance.

Alternative 2: This alternative would harvest approximately 114 acres, 49 of which would be cable yarded. Roughly 65 acres would be harvested using low pressure soft-track ground based equipment on slopes up to 50%. Cable yarding would have a negligible effect on the soil resource, and the use of soft-track skidding equipment would greatly reduce the soils impacts compared to conventional ground based systems. Approximately 4 acres of the ground based harvesting and 20 acres of the cable harvesting would occur on LT 357. About 4 acres of ground based harvest would take place on LT 360, and the remaining 86 acres of harvest proposed with this alternative would occur on LT 355. In addition, approximately 1.0 mile of new road construction would occur with Alternative 2, approximately 0.1 mile of which would be constructed on LT 357, and the rest would be located on LT 355. The road construction on LT 357 has the potential to increase the hazard of slope failure. This risk would be minimized through implementation of BMPs for surface drainage and through prompt revegetation of exposed soil.

Alternative 3: Alternative 3 would treat the same stands as Alternative 2, plus an additional 328 acres of harvest in the proposed project area. Of these additional acres, 3 would be harvested using soft-track ground based equipment, 7 would be harvested with a cable system, and the remaining 318 acres would be removed with a helicopter. Stand 4, the ten acre stand that would use helicopter and cable systems, is a salvage of blown down timber and is located in LT 357. The remaining acres of helicopter harvest occur in LT 251 and 408. In order to access these stands, an additional 0.4 miles of road would be constructed on LT 357. This additional segment of road would require the same mitigation measures listed under Alternative 3 for construction on LT 357.

Alternative 4: Alternative 4 would treat the same stands and acreage as Alternative 3; however, this alternative would construct an additional 0.8 miles of new road beyond that proposed in Alternative 3. The ten acres in Stand 4 would be harvested the same as described in Alternative 3. The 318 acres harvested by helicopter in Alternative 3 would be harvested using a combination of ground based/ cable yarding and helicopter logging options. The ground base/cable yarding would be used on between 87 and 231 acres depending on the harvest systems feasibility on the terrain. The helicopter logging system would be used on the remaining acreage depending on the economic viability. These harvest acres occur in LT 251 and 408. With Alternative 4, the stands on the east side of Keeler mountain would be accessed through construction of an additional 0.8 miles of road in addition to that proposed with Alternative 3. This additional segment of road would be constructed on landtypes 251 and 408. These landtypes have high sediment delivery rates associated with road construction, but all applicable BMPs would be applied to minimize these impacts. Sedimentation is a soil related impact that is covered in the watershed analysis.

Adverse impacts to soils or soil productivity resulting from the proposed project would be minimal provided standard BMI's, hydrologist recommendations and the mitigations measures discussed in Appendix A are applied.

VII. ROADS

Alternative 1 (No Action): Roads would remain in their current condition with inadequate erosion control and surface drainage, the existing mass failure would not be stabilized, and stream crossings with improperly designed surface drainage would not be improved unless other sources of funding became available to repair them. These conditions would persist at current levels and recover or degrade as dictated by natural and pre-existing conditions.

Effects Common to All Action Alternatives: Each of the proposed action alternatives would improve the existing road system to meet current BMI's, including regularly spaced surface drainage features and erosion control. All stream crossings with inadequate surface drainage would be improved, and the two existing cut-slope failures on the South Fork Keeler Creek road would be stabilized and re-vegetated. The proposed action alternatives would construct roads as described in the Cumulative Effects to Soil Productivity section. All of the proposed new road construction would be designed using the most current BMI's, and access to all roads would be restricted following project completion. In addition, each of the action alternatives would permanently close and rehabilitate the same amount of road that will be constructed in the South Fork Keeler Creek watershed. The proposed segments of road are FS road #14334 and several spur roads, located on Kootenai National Forest land in sections 26, 34 and 35 of T30N R34W and sections 3 and 4 of T29N R34W. The closure and rehabilitation would consist of removing and recontouring two stream crossing culverts along road #14334, installing several dozen surface drainage features to minimize the sediment production and transport, and seeding all disturbed areas with site adapted ground cover plants to stabilize exposed soil. These segments of road would not be accessible by motorized traffic, and would be removed from the road system of the KNF.

VIII. NOXIOUS WEED MANAGEMENT

Alternative 1 (No Action): Under the No Action alternative, the risk of spread of noxious weeds would not be increased above existing levels. Noxious weeds would continue to spread or recede as dictated by pre-existing conditions and current management.

Effects Common to All Action Alternatives: Hauling of logs, ground based skidding, and road construction has the potential to spread noxious weeds by exposing bare soil. Use of roads where noxious weeds are present can help spread seeds to areas not currently infested with noxious weeds. Each of the action alternatives proposes to use ground based harvest equipment and construct new road, which would increase the potential of spreading noxious weeds into the proposed project area. The mitigation measures discussed in Appendix A should minimize the risk of noxious weed spread in the proposed project area.

IX. WATERSHED

A. CUMULATIVE WATERSHED EFFECTS

The potential watershed cumulative effects of the alternatives were determined using the standard equivalent clearcut area (ECA) procedure outlined in "Forest Hydrology Part II," (Haupt et al. 1974) Region 1, USFS. ECA is calculated by estimating the percent of live tree canopy to be removed. This level of canopy removal is then converted to an approximately equivalent area of clearcut. Precipita-

tion-runoff relationships were adopted from Phil Farnes, "Hydrology of Mountain Watersheds," 1978. Precipitation and vegetative-hydrologic recovery were determined using data from the nearby Kootenai National Forest. This model is limited in the fact; that it does not assess the amount of sediment routed to creeks by activities, or sediment generated by the channel adjusting to increases in water yield, but is well suited to an analysis of this type because it is based on proven relationships between vegetative removal and increases in water yield. The watershed map for the Project Area is located in Appendix D.

Alternative 1: The no action alternative would generate no cumulative watershed impacts beyond those under current management. Current water yield increases (WYI) and ECA levels for each watershed in the project area are listed in the attached Table 4-5 under the No Action heading. Under this alternative, these values would remain at or near present levels and would continue to decline as past harvest units continue to regenerate and move closer to pre-disturbance levels of water use and snow pack distribution.

Effects Common to All Action Alternatives: Each of the action alternatives proposes to construct new roads. The amount of new construction varies by alternative. For every mile of new road constructed in an alternative, an equal amount of existing road would be permanently closed and rehabilitated elsewhere in the watershed. Portions of the rehabilitated road would be recontoured to the natural slope, two culverts would be removed and the stream banks would be laid back to a stable angle and armored, surface drainage and erosion control features would be installed, and the entire system would be seeded with site adapted plants to stabilize bare soil. New road construction would add additional ECA to the watershed, and roads can increase the delivery of surface water to draws and streams if surface drainage features are not installed properly.

The Kootenai National Forest has a preliminary plan to conduct a timber sale in the North Fork and Main Stem of Keeler Creek watersheds. The project is in very early development, and would likely not commence until 2000 or 2001 at the earliest. The tentative plan involves approximately 1200 to 1300 acres of harvest with a variety of proposed prescriptions. With implementation of any DNRC alternative, and the Kootenai National Forest, the Keeler Creek watershed would have a total of 3,976 total acres of timber harvest. This level of harvesting shows that less than 13% of the watershed would be in a harvested condition, and far less would be in ECA since old units are in various stages of revegetation and recovery. In general, a stream channel will not begin to show a response to water yield increases below an 8 to 10% increase in water yield. This level of water yield increase is reached when the ECA in a watershed reaches 25%. As a result, the Forest Service proposal, if implemented, and any action alternative with this proposal would not put the Keeler Creek watershed near even the most conservative threshold of concern for cumulative watershed effects.

Alternative 2: This alternative proposes to harvest timber from approximately 114 acres using a regeneration harvest prescription, and construct approximately 1.0 mile of new road to access the proposed harvest units. The harvest prescription would remove 95% of the live crown and, when combined with the new road construction, would generate approximately 115 ECA. Of these acres, 32 would be located in watershed A, generating approximately 31 ECA, and the remaining acres are distributed as shown in Table 4-5. In addition, approximately 1 mile of new road would be constructed through the proposed harvest units to access the timber. Water Yield Increases in the project area would reach a maximum of 11% over natural conditions in watershed B, and would increase to 12.3% in watershed C (see Table 4-5). Watersheds D, E, F, G, H (Appendix D) and I would be unaffected by this proposal. None of these proposed harvest activities would put any of the watersheds near their threshold of concern.

Alternative 3: Alternative 3 would harvest the same acres as Alternative 2, but would also treat an additional 328 acres and construct an additional 0.4 miles of new road in Section 36. Of these acres, 10 would be harvested in watershed D, the remaining 318 acres are located on the east side of Keeler

Mountain in watersheds E, F and G. The 10 acre unit in the north portion of the state section would be a salvage of blown down trees and trees that are a high risk of falling. This prescription would remove approximately 25% of the live crown and generate 1 ECA. The 318 acres would be treated by removing approximately 50% of the live canopy. Since there are no defined channels in or below these units, the bottoms of the draws are primarily bedrock, and the draws eventually go subsurface and do not contribute surface flow to the Lake Creek drainage, water yield increases are not anticipated to be a problem as a result of this Alternative. Any water yield increases generated in these watersheds would have no direct, indirect or cumulative effects on Lake Creek. None of these proposed harvest activities would put any of the watersheds near their threshold of concern.

Alternative 4: Alternative 4 would harvest the same acres as Alternative 3, using the same harvest prescriptions, but construct an additional 0.8 miles of new road in addition to the 1.4 miles proposed in Alternative 3. All of the 0.8 miles of additional road construction would be done on the east face of Keeler Mountain in watersheds (Appendix D) E, F and G. Under a possible variation of alternative 4, some portions of the proposed harvesting in watersheds E, F and G may not be completed. Should these portions not be harvested, there would be less risk of water yield increases in watersheds E, F and G. None of these proposed harvest activities would put any of the watersheds near their threshold of concern.

B. WATER QUALITY

Timber harvesting activities can directly impact water quality if not properly located or mitigated. The Streamside Management Zone (SMZ) Law and Rules regulate forest management activities that occur adjacent to streams, lakes and other bodies of water. All of the proposed harvest units and road locations will be designed and implemented in accordance with the SMZ law, the immediate actions for bull trout recovery, and all applicable BMP's.

Alternative 1: Under the No Action Alternative, no new roads would be constructed and no timber would be harvested. No new water quality impacts would be generated in the watersheds considered in the proposal beyond those already occurring due to natural processes or past management. Under this alternative, none of the proposed stream crossing replacements, road improvements, or repair of existing sediment sources would be completed with this sale. These problems would continue to recover or degrade as dictated by natural and preexisting conditions until funding sources become available to repair them.

Effects Common to All Action Alternatives: Each of the action alternatives proposes to construct new roads. The amount of new construction varies by alternative. For every mile of new road constructed in an alternative, an equal amount of existing road would be permanently closed and rehabilitated elsewhere in the watershed. The segments of road proposed for rehabilitation are FS road #14334 and several spur roads, located on Kootenai National Forest land in Sections 26, 34 and 35 of T30N R34W and Sections 3 and 4 of T29N R34W. The road closures would consist of removing culverts where necessary, recontouring stream crossings, installing road surface drainage features and reseeding all disturbed areas. These segments of road would not be accessible by motorized traffic, and would be removed from the road system of the KNF. These rehabilitation measures would lead to short term input of sediment to the creeks during the process of culvert removal, and bare ground would be exposed until grass seeding took effect, but these proposed road rehabilitations would lead to a long term decrease in sediment production and delivery to the South Fork of Keeler creek.

Alternative 2: The primary impact to water quality from Alternative 2 is the repair of the current road system. Proposed repair activities include installation of adequate surface drainage and ditch relief structures over the entire 4.6 miles of existing Forest Service road which is proposed for hauling, stabilization of an existing cutslope which is unstable and slumps annually, and re-routing surface and ditch runoff where they are routed directly to streams and draws. These activities will lead to short term

Table 4-5: Summary of Watershed Cumulative Effects

Watershed	Alternative 2			Alternatives 3 & 4		
	Watershed B	Watershed C	Watershed D	Watershed B	Watershed C	Watershed D
Acres Harvested:						
No Action	74	0	18	74	0	18
Proposed	53	29	0	53	29	10
Existing and Proposed[1]	127	29	18	127	29	28
Miles of Road:						
No Action	2.9	0.3	0.7	2.9	0.3	0.7
Proposed	0.6	0.2	0	0.6	0.2	0.3
Existing and Proposed	3.5	0.5	0.7	3.5	0.5	1.0
Equivalent Clearcut Acres:						
Threshold[4]	194	57	179	194	57	179
No Action	43	1	10	43	1	10
Proposed[2]	53	29	0	53	29	2
Existing and Proposed	96	30	10	96	30	12
% Water Yield Increase:						
Threshold	18%	18%	18%	18%	18%	18%
No Action	5.0	0.5	1.1	5.0	0.5	1.1
Proposed	6.0	11.8	0	6.0	11.8	0.3
Existing and Proposed	11.0	12.3	1.1	11.0	12.3	1.4
Existing and Proposed After 10 yrs.	8.2	8.9	0.8	8.2	8.9	1.1

1 "Existing and Proposed" refers to the value (e.g. Water Yield Increase, ECA, etc.) that would result if the alternative were selected, combining the No Action value with that generated by the proposal.

2 The values shown here reflect the total ECA generated from both road construction and harvest.

3 "Existing and Proposed after 10 yrs." refers to the projected value (e.g. Water Yield Increase, ECA, etc.) that would result from alternative 1 given 10 years of recovery.

4 Allowable ECA was set based on an 18% allowable increase in water yield. This value is a result of excellent channel stability, and/or lack of a defined channel, which means that there is a high capacity for water yield increase before adverse impacts to the channel appear. None of the three watersheds would have water yield increases higher than 12.3% (watershed C), a level at which only unstable systems are at risk of adverse impacts to channel stability and water quality.

increases in sediment during the period of operation, particularly in and around the existing draw and stream crossings, but will lead to a long term decrease in sediment by eliminating chronic sources of sediment.

The 114 acres of timber harvest proposed with this alternative would be accessed by constructing approximately 1.0 mile of new road. The proposed road would be placed through the middle of the stands to be treated. Logging systems in the proposed harvest units would use cable yarding below the road, and low pressure soft-track skidders above the road. Each of these logging systems have low impact to ground disturbance, and none of the proposed harvest is located in or near a stream or draw. The proposed new road would cross a series of seven draws in watersheds A, B and C, which have no defined channel or banks. Construction of this road has the potential to produce additional sediment to the draws through exposure of bare soil. For the first 3 years or so, risk of sediment delivery will be increased, but this will decrease with time as the road stabilizes and grass seeding of bare cut and fill slopes takes effect. All appropriate mitigation measures and BMP's would be applied to all draw crossings and road construction.

Alternative 3: Alternative 3 would produce similar impacts to those described in Alternative 2. Each of the stands entered in Alternative 2 are also proposed for harvest under Alternative 3, and all proposed road improvements would also be completed. In addition, this alternative would harvest another 328 acres in the project area and construct an additional 0.4 miles of new road. Ten acres of this are located in watershed D, and would use a combination of cable and ground based systems to salvage blown down trees. The remaining 318 acres would be helicopter logged. Water quality effects under Alternative 3 would be similar to those described under Alternative 2. Use of ground based logging systems increases the risk of erosion and sediment delivery through exposure of bare soil by machinery. Yarding with a cable system presents a small risk of erosion and sediment delivery in the skyline corridors where logs are pulled. The additional 0.4 miles of new road construction would be completed in watershed D. The potential impacts of this portion of road would be similar to those described under alternative 2. Risk of bare soil erosion is increased with new construction, but this portion of road does not cross a defined draw or stream. The limited nature of the harvest in the north watershed presents a low risk of impacts to water quality, and none of the proposed harvest would take place in or near a draw or stream. The helicopter yarding would have minimal impacts to water quality on the east face of Keeler Mountain. The timber harvest would occur primarily on the ridges. The draws and excessively steep area would be deferred from harvest.

Alternative 4: Alternative 4 would produce similar impacts to those described in Alternative 3. Each of the stands entered in Alternative 2 are also proposed for harvest under Alternative 3, and all proposed road improvements would also be completed. An additional 0.8 miles of road would be constructed beyond the road segment listed in Alternative 3. This 0.8 miles of road may increase the sediment delivery to draws in watersheds E, F and G on the east face of Keeler Mountain through exposure of bare soil. At the elevation where the road would be built, no defined draws or streams exist. The logging system for the 318 acres of harvest in this alternative would be yarded using a combination of low pressure soft-track skidders above the road, cable yarding below the road (between 1000' - 2000'), and a helicopter for the remainder. All potential water quality impacts to watersheds A, B, C and D in Alternative 4 are identical to those in Alternative 3. The potential impacts to watersheds E, F and G would be similar to those in Alternative 3. Risks would be slightly higher due to some additional acreage harvested with ground based and cable yarding equipment, but as in Alternative 3, harvesting would be concentrated on small ridges and avoid draw bottoms and creeks. Alternative 4 proposes several variations in harvesting methods ground based and cable methods of harvest vary from 87 acres to 231 acres depending on the feasibility of the equipment on the terrain. The helicopter logging ranges from 0 to 231 acres depending on the feasibility of the cable harvest system and the economics associated with helicopter logging. A total of 318 acres will be harvested under any of the variations. Under any of the variations of this alternative, the increase in cable harvesting acreage would increase

the risk to water quality and sedimentation over helicopter logging, however, if all mitigation measures are implemented the associated variation of impacts to soil and water would be minimized.

The proposed improvements to the main haul route, stabilization of an existing slope failure, permanent closure and rehabilitation of 2.2 miles of existing road; and provided the following mitigation measures, BMPs and the SMZ law are followed, implementation of any of the proposed action alternatives would lead to an improvement in water quality over the current condition.

X. VISIBILITY FROM KEELER MOUNTAIN LOOKOUT

Alternative 1 (No Action)

- For the short term, the visibility from the lookout will continue to be compromised from the encroachment of trees to the southeast of the lookout.
- Sometime in the foreseeable future, a small patch (approximately 1/4 acre) of trees will be cut down and left to provide visibility for the lookout

Alternative 2

- For the short term, visibility from the lookout will continue to be compromised from the encroachment of trees to the southeast of the lookout.
- Because of the low value of the timber and long skidding distances, the small patch (1/4 acre) of timber will not be harvested under this alternative.
- Sometime in the foreseeable future, a small patch (approximately 1/4 acre) of trees will be cut down and left to provide visibility for the lookout.

Alternatives 3 and 4

- Under these alternatives, the small _ acre patch of timber southeast of the lookout will be harvested through helicopter or ground based methods due to the improved access provided under the alternatives.

XI. VISUAL RESOURCES

Alternative 1 (No Action)

- No direct effects to the visual resource would result from this alternative. There may be an indirect effect resulting from the gradually increasing risk of a stand replacing fire on the east face of Keeler Mountain.

Alternative 2

- All silvicultural treatments and road construction occur on the west facing aspect of Keeler Mountain, hence there are no direct visual impacts for viewers along the I Highway 56 corridor or Bull Lake.

- There would be the same potential for indirect effects as described for Alternative 1.

Alternative 3

- This alternative would treat most of the visible east slope with irregular group selection cuts that removed approximately 50% of the existing canopy. Helicopter logging would be employed so no roads would be constructed within the viewing area.
- Numerous natural openings currently exist in areas of extremely thin soils and rocky outcrops, but there are also continuous bands of timber extending from the lower slopes up steep draws to the top of the mountain. This general texture would be maintained by the irregular group selection and feathering into more closed canopy areas as well as along property lines.

Alternative 4

- Silvicultural treatments in this alternative would be the same as described for Alternative 3. However, a road would be constructed near the top of the mountain. This road would be located on existing benches and would only be visible for short, intermittent stretches where it traversed between benches. These portions of the road would be screened by leaving existing trees on the lower side of the road and would be full benched with the excavated material end-hauled, rather than being side cast.
- Portions of the cable corridors would be visible where they cross residual stands. The evenly spaced vertical line appearance which frequently denotes cable yarded units will be partially mitigated by the irregular group selection harvest method which would leave isolated segments of corridors visible.

Cumulative Effects

- The large-scale viewshed beside and behind Keeler Mountain is characterized by timbered mountains with a combination of natural and manmade openings. Many of the older cutting units are blocky clearcuts, which are particularly obvious during periods with snow cover.
- This action would have little impact on the overall aesthetic quality of the area, and in particular, would not increase the unnatural visual qualities introduced by square sided cutting units.

XII. AIR QUALITY

Alternative 1

The no action alternative would not create impacts beyond existing levels to air quality.

Alternative 2, 3 and 4

Burning logging residue would produce particulate matter and the smoke generated from prescribed burning may reach populated areas. The stipulations and specifications listed for air quality in Appendix A should limit the impacts from burning to levels not exceeding EPA/state/county/local standards. Cumulative effects to air quality would not exceed the levels defined by the State of Montana Cooperative Smoke Management Plan (1988) and managed by the Montana Airshed Group.

XIII. ECONOMICS

The economic analysis for the Proposed Keeler Timber Sale is a cash-flow analysis to estimate the flow of revenues and costs from the different treatments that are related only to this project. No future activities are included because projecting treatments into the future is uncertain due to changes in policies, markets, personnel, and natural events. The analysis estimates the cash flow from timber harvesting and non-administrative costs for the alternatives considered. DNRC does not have a formal accounting system to track costs for individual projects from start to finish.

ASSUMPTION - ALL ALTERNATIVES

1. The estimated delivered log prices were from the most recent Sawlog and Veneer Log Price Report, July - September, 1998 from the Bureau of Business and economic research, University of Montana. A weighted average species log price was used based on 85 percent of the net sale volume being peeler logs and 15 percent being sawlogs.

2. The stumpage value was estimated by using a residual value approach. The stumpage value is an estimate for the winning bid for the timber sale. The value was estimated by subtracting the stump to mill costs, Forest Improvement, and development costs from the estimate for delivered log prices. Stump to mill costs were estimated by Libby Unit personnel based on local sources. Stump to mill costs by harvest method were; Soft track/Skyline = $130 per MBF, skyline = $150 per MBF, extended skyline = $175 per MBF, and Helicopter = $320 per MBF.

3. The harvested volumes for the alternatives were based on estimates from Libby Unit personnel. It was assumed that 26.5 percent of the volume that is planned to be harvested with a helicopter logging system in Alternative 3 can be logged from a new road with a Skyline logging system in Alternative 4. Another logging option was evaluated for Alternative 4. The Alternative 4 extended skyline assumes that 75% of the volume that is planned to be harvested with a helicopter logging system in Alternative 3 can be logged from a new road with an extended skyline logging system in Alternative 4.

4. Development costs were estimated by Gary Hadlock, Logging Engineering Specialist, and Northwest Land Office, and varied by alternatives. Development costs on this proposal are the estimated costs of road and watershed improvement items that would be paid for by the purchaser. These improvements provide access to the State Trust Lands involved and improve water quality on State and USFS land. All development costs are paid for by the sale and are not amortized over time.

5. Costs, revenues, and returns are estimates intended for relative comparison of alternatives. They are not to be used as absolute estimates of return.

6. The FI cost is based on program-wide costs, and includes the costs to maintain the ongoing staffing, treat stands, maintain roads for the current year, and acquire rights-of-way. Money collected under FI from a purchaser provides the funding for the State to accomplish projects such as tree planting, site preparation, slash treatment, thinning, road maintenance, rights-of-away acquisitions, and some timber sale-related activities. Thus, DNRC is able to improve the long-term productivity of timber stands on State trust lands and maintain or acquire access for future revenue-producing projects.

7. The sale-specific forest-improvement (SSFI) costs are the current cost estimates for the amount and types of treatments (site preparation, hazard reduction, planting, etc.) planned for each of the alternatives being considered. Funding to complete these projects would be collected from

current or future timber sales, depending on the timing of the treatments. No cost estimates for replanting or inter-planting are included. After planting, we will follow our procedures to evaluate the survival from planting and the overall regeneration status. Once we have completed these evaluations, and after assessing the current budget, market and department direction at that future time we will take the appropriate action. The appropriate action could be replant, inter-plant or do nothing and let the natural regeneration continue to regenerate the treatment unit.

The estimated total timber dollar return to the trust is the estimated stumpage price (winning bid price $/MBF) multiplied by the estimated harvest volume.

9. The estimated total timber dollar amount collected by the State (total revenue) is FI costs plus the estimated stumpage price multiplied by the estimated harvest volume.

10. DNRC has a sustained yield harvest volume level of 42.164 MMBF per year Statewide. If timber is not sold and harvested relating to the highest volume alternative in this project, timber would be sold and harvested somewhere else.

11. Limitations of the economic analysis: Only know costs and benefits that are associated with the activities listed below are considered. None of the potential benefits associated with leaving trees (i.e., snag recruitment, structural diversity, aesthetics, wildlife habitat, nutrient recycling, etc.) are considered.

12. This area has no potential for cabin development based on personal communication with Mike Justus.

13. Alternative 1 is no action. There are no revenue producing activities that are solely dependent on the lands involved in this project.

TABLE 4-6: COSTS AND BENEFITS ASSOCIATED WITH THIS PROJECT

COSTS AND BENEFITS ASSOCIATED WITH THIS PROJECT				
	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
1. Estimated Total Harvest Volume (MBF) (Assumption 1)	0	2,452	6,356	5,465 to 6,356
2. Delivered Log Value ($/MBF) (Assumption 1)	$0	$378.86	$365.22	$365.22
3. Stump to Mill Costs ($/MBF) (Assumption 2)	$0	$140.00	$241.41	$180.47 to $216.19
4. Development Cost ($/MBF) (Assumption 4)	$0	$29.46	$14.04	$17.83 to $29.60
5. Forest Improvement ($/MBF) (Assumption 5)	$0	$46.41	$46.41	$46.41
6. Stumpage Value - ($/MBF) (line 1 - line 2 - line 3 - line 4 - line 5) (Assumption 2)	$0	$162.99	$63.35	$84.78 to $120.51
7. Total $ Value based on Stumpage, FI cost and Development Cost multiplied by harvest volume ((line 4 + 5 + 6) * line 1)	$0	$585,685	$786,873	$947,171 to $1,174,271
8 Total $ Return to the Trust (line 1 x line 6)	$0	$399,651	$402,653	$538,862 to $776,381

Based on the results in the previous table, Alternative 4 would yield the highest return to the trust at $538,862, followed by Alternative 3 at $402,653 and last Alternative 2 at $399,651 not including treatment, field preparations and administration costs. The amount of volume increase between alternative 2 and alternative 3 equals 3,904 MBF, while the increase in the return to the trust equals only $3,002 or less $1.0 per MBF.

Based on the results in the previous table, Alternative 4 would yield the highest return to the trust at $538,862, followed by Alternative 3 at $402,653 and last Alternative 2 at $399,651 not including treatment, field preparations and administration costs. The amount of volume increase between Alternative 2 and Alternative 3 equals 3,904 MBF, while the increase in the return to the trust equals only $3,002 or less $1.0 per MBF.

If alternative 4 was logged using the extended skyline logging system the estimated stumpage value would equal $120.51 per MBF with an estimated stump to mill costs of $180.47 per MBF based on the assumptions in 3 and 4. The development and FI costs per MBF would remain the same as in Alternative 4. Alternative 4 with extended skyline logging would yield an estimated total return to the trust equaling $765,962 and the estimated total dollar value of the stumpage, FI Cost and Development Cost would equal $1,174,271.

Table 4-7 displays the specific forest improvement costs for treatments that are planned for each alternative in this project. The treatments included are slashing and planting.

TABLE 4-7: ESTIMATED SPECIFIC FOREST IMPROVEMENT COSTS ASSOCIATED WITH THIS PROJECT

ESTIMATED SPECIFIC FOREST IMPROVEMENT COSTS ASSOCIATED WITH THIS PROJECT				
	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
1. Estimated Total Harvest Volume (MBF) (Assumption 1)	0	2,452	6,356	6,356
2. Total $ Sale Specific Forest Improvement Costs (assumption 7)	0	$34,189	$67,772	$67,772
3. Sale Specific Forest Improvement Costs ($/MBF) (line 2 /line 1)	0	$13.94	$10.66	$10.66

The ranking of alternatives based on the return to the trust and subtracting sale specific costs would be Alternative #4 ($471,090) first, Alternative #2 ($365,462) second, and Alternative #3 ($334,881) is last.

Profitability of the Helicopter Component

The issue was raised related to the profitability of the helicopter component of these alternatives. Tables 4-8, 4-9 and 4-10 display the difference between alternatives with and without helicopter. In each table, one of the alternatives is held constant. The difference in harvest volume, return to the trust and the average marginal change in value is calculated between the base alternative and other alternatives displayed in the table. The total $ Return to Trust does not include the costs related to marking, cruising, sale administration and other costs that will be incurred after the MEPA documentation is completed.

Other issues to consider that are not reflected in the numbers:

1. If we don't harvest the helicopter volume; what is the likelihood of us having a profitable sale in this section in the future? Is there enough good timber left combined with the helicopter unit to make a profitable sale?

2. If we don't harvest the helicopter volume now should we drop these stands from our timber base? When we update the sustained yield analysis, these stands would be deferred, thus a lower sustain yield target would be calculated.
3. The growth, vigor and risk for insect, disease, fire or blow down of the stands would be delayed if helicopter logging is delayed.
4. The work load (current and future) for the staff on the Northwest Land Office and other units.
5. How much risk is there in meeting our target volume for the Northwest Land Office?
6. What amount of low or negatively valued timber can the Northwest Land Office and statewide timber program handle and still have a revenue to cost ratio greater than one?

TABLE 4-8 DIFFERENCE BETWEEN ALTERNATIVES

				Difference Between Alternative 3 (Row 2), Alternative 4 (Row 3), and Alternative 4 No Helicopter (Row 4) with Alternative 2 (Row 1)		
	1.Deve-lopment Cost ($/MBF)	2. Total Harvest Volume (MBF)	3. Total $ Return to Trust	4.Difference in Harvest Volume (MBF)[1]	5. Difference in $ Return to the Trust[2]	6.Average Marginal Change in Value/MBF (col 5/col 4)[3]
1. Alternative 2	$29.46	2,452	$399,651	NA	NA	NA
2. Alternative 3	$14.04	6,356	$402,653	3,904	$3,002	$ 1
3. Alternative 4a	$17.83	6,356	$538,862	3,904	$139,211	$ 36
4. Alternative 4b (No Helicopter)	$29.60	3,738	$565,473	1,286	$165,822	$129
5. Alternative 4c Extended Skyline	$17.83	6,356	$765,962	3,904	$366,311	$94
6. Alternative 4d Extended Skyline (No Heliocpter)	$20.73	5,465.5	$776.381	3,013.5	$376,730	$125

1 Column 4 is calculated by substracting 2,452, the volume for Alternative 2, from the total harvest volume for the current row (2, 3, & 4) (column 2).

2 Column 5 is calculated by substracting $399,651 (total $ Return or Loss to Trust) from the total $ return to trust for the current row (2, 3, & 4) (column 3).

3 Column 6 - Average Marginal Change in Value/MBF for the difference in $ Return or Loss to the Trust (column 5) divide by the difference in Harvest Volume (column 4).

TABLE 4-9: DIFFERENCE BETWEEN ALTERNATIVE 4 AND ALTERNATIVE 4 NO HELICOPTER

DIFFERENCE BETWEEN ALTERNATIVE 4 AND ALTERNATIVE 4 NO HELICOPTER						
				Difference Between Alternative 4 and Alternative 4 No Helicopter		
	1. Development Cost ($/MBF)	2. Total Harvest Volume (MBF)	3. Total $ Return to Trust	4. Difference in Harvest Volume (MBF)	5. Difference in $ Return to the Trust_	6. Average Marginal Changed in Value/MBF (5/Col. 4)
Alternative 4 No Helicopter	$29.60	3,738	$565,473.00	NA	NA	NA
Alternative 4	$17.83	6,356	$538,862.00	2,618	-$26,611.00	-$10.00

Column 4 is calculated by subtracting 3,738, the volume for Alternative 4b No Helicopter from 6,356, the total harvest volume for the Alternative 4a (column 2).
[2] Column 5 is calculated by subtracting $565,473, the total $ Return to Trust for Alternative 4b No Helicopter from $538.862, the total $ return to trust for Alternative 4a (column 3).
[3] Column 6 - Average Marginal Change in Value/MBF for the difference in $ Return or Loss to the Trust (column 5) divide by the difference in Harvest Volume (column 4).

TABLE 4-10: DIFFERENCE BETWEEN ALTERNATIVE 4c EXTENDED SKYLINE AND ALTERNATIVE 4d EXTENDED SKYLINE WITH NO HELICOPTER

DIFFERENCE BETWEEN ALTERNATIVE 4c EXTENDED SKYLINE AND ALTERNATIVE 4d EXTENDED SKYLINE WITH NO HELICOPTER						
				Difference Between Alternative 4c Extended Skyline and Alternative 4d Extended Skyline No Helicopter		
	1. Development Cost ($/MBF)	2. Total Harvest Volume (MBF)	3. Total $ Return to Trust	4. Difference in Harvest Volume (MBF)	5. Difference in $ Return to the Trust_	6. Average Marginal Changed in Value/MBF (5/Col. 4)
Alternative 4d Extended Skyline with No Helicopter	$20.73	5,465.5	$776,381.00	NA	NA	NA
Alternative 4c Extended Skyline	$17.83	6,356	$765,962.00	890.5	-$10,419.00	-$11.70

_ Column 4 is calculated by subtracting 5,465.5 the volume for Alternative 4d Extended Skyline No Helicopter from 6,356, the total harvest volume for the Alternative 4c (column 2).
[2] Column 5 is calculated by subtracting $776,381, the total $ Return to Trust for Alternative 4d Extended Skyline No Helicopter from $765,962, the total $ return to trust for Alternative 4c (column 3).
[3] Column 6 - Average Marginal Change in Value/MBF for the difference in $ Return or Loss to the Trust (column 5) divide by the difference in Harvest Volume (column 4).

Conclusion Marginal Analysis

Based on the previous three tables adding the helicopter volume appears to reduce the total revenue to the trust. These estimates don't include costs for field preparation and administration. These estimates are based on the assumptions stated. Changes in logging costs downward or upward in delivered log value could make the helicopter volume profitable. Given these estimates, it would be prudent to either drop the helicopter units or to market the helicopter portion of the selected alternatives as a separate sale and contract. Marketing the helicopter portion separately with a long contract (five years) and positive minimum bid, would insure a positive stumpage value. The return from the Northwest Land Office and the program as whole would be negatively impacted by selling too much low or negatively valued timber in one year.

B. Direct Effects of Alternatives A, B, and C on Jobs and Income

The impacts on local communities are estimated by quantifying jobs and income associated with harvesting and processing the timber into final products. Regional response coefficients estimated for northwestern Montana indicate that timber harvesting provides 10.58 direct jobs per MMBF, and a total direct income of $ 337,146 (Keegan *et al.*) for an average annual income of $ 31,866.35 per job.

It is important to note that the response coefficients are an accounting of what has happened historically. These response coefficients are average values and are not marginal values. To say the consequence of not selling this sale would result in the loss of XX amount of jobs and YYY amount of income may not be correct. A marginal analysis would have to be done in order to be more certain that there would be a reduction in income and employment. Lack of a marginal analysis and the use of average numbers commonly results in over estimation of the total economic effects (Godfrey and Beutler 1993).

Conclusion

The ranking of the alternatives based on the return to the trust and subtracting sale specific costs would be Alternative 4d, Alternative 4c, Alternative 4b, Alternative 4a, Alternative 2, and Alternative 3. Given the current market for stumpage, it is prudent to market the helicopter volume as separate contract if either Alternatives 3 or 4 is selected. Increasing the contract length (4 years) would help make the helicopter sale more appealing. Another option is to drop these stands from the timber base. Each acre dropped would reduce the statewide sustained yield harvest by 116 BF per year. Given the assumed costs and revenue estimates it appears that the helicopter volume reduces revenue to the trust. Building the road as part of Alternative 4d extended skyline or Alternative 4b and not harvesting the helicopter volume would yield an additional value of $376,730 and $165,782 respectively, over Alternative 2.

IRRETRIEVABLE AND IRREVERSIBLE COMMITMENTS OF NATURAL RESOURCES

Irretrievable

According to Shipley (1995), irretrievable commitments of resources are lost for a period of time. Stands in the project are mature with individual trees more than 200 years old. Any of the timber-harvesting alternatives would cause some of these large, old, live trees to be irretrievably lost; they would no longer contribute to future snag recruitment, stand structural and compositional diversity, aesthetics, wildlife habitat, nutrient recycling processes, or any other important ecosystem functions.

Irreversible

According to Shipley (1995), irreversible commitments of resources are commitments that cannot be reversed or replaced. The initial loss of trees due to timber harvesting would **not** be irreversible. Natural regeneration combined with site preparation and artificial regeneration would promote the establishment of new trees. If management decisions allow for the continued growth of established trees, they would ultimately become equivalent in size and age to the irretrievably harvested trees.

Relationship Between Short-Term Use and Long-Term Productivity

All harvest alternatives are designed to protect the long-term productivity of the sites. It is anticipated that the stocking reduction would occur under each alternative would increase the health and growth of residual stands, resulting in an increase in long-term productivity. The post-harvest stands would more closely resemble stands that existed under average historic conditions, and would provide a variety of opportunities for use in the long term.

GLOSSARY

Age Classes	A distinct group of trees, or portion of growing stock recognized on the basis of age (i.e., seedling, pole, mature).
Airshed	An area defined by a certain set of air conditions; typically a mountain valley in which air movement is constrained by natural conditions such as topography.
Analysis Area	The geographic area defining the scope of analysis for a particular resource.
Appropriate conditions	Describes the set of forest conditions determined by DNRC to best meet the State Forest Land Management Plan (SFLMP) objectives. The four main components useful for describing an appropriate mix of conditions are cover type proportions, age class distributions, stand structural characteristics, and the spatial relationships of stands (size, shape, location, etc.), all assessed across the landscape.
Bear Analysis Area (BAA)	Management subunits of a BMU approximately 5,000 to 15,000 acres in size.
Bear Management Unit (BMU)	A geographic subdivision of grizzly bear habitat, which approximates the home range size of a reproductive, female grizzly bear (about 100 square miles in the Cabinet-Yaak ecosystem).
Best Management Practices (BMPs)	Guidelines to direct forest activities, such as logging and road construction for the protection of soils and water quality.
Biological Assessment (BA)	Information (document) prepared by or under the direction of the Federal agency concerning listed and proposed threatened and endangered species and proposed critical habitat that may be present in the action area and the evaluation of potential effects of the action on such species and habitats.
Biodiversity	The variety of life and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur.
Board Foot	144 cubic inches of wood that is equivalent to a piece of lumber 1-inch by 1-foot wide by 1-foot long.
Canopy	The upper level of a forest, consisting of branches and leaves of taller trees.
Cavity	A hollow excavated in trees by birds or other animals. Cavities are used for roosting and reproduction by many birds and mammals.

Clearcut With Reserves	A variation of the clearcutting method where reserve trees are left for all or part of a stand rotation and serve a specific function that is consistent with management objectives.
Compaction	Increase in soil density caused by force exerted at the soil surface, modifying aeration and martinet availability.
Connectivity	The quality, extent, or state of being joined; unity; the opposite of fragmentation.
Core Area	See Security Habitat (grizzly bears)
Cover	See HIDING COVER and/or THERMAL COVER.
Co-dominant tree	A tree which extends its crown into the canopy, receiving direct sunlight from above and limited sunlight on its sides. One or more sides are crowded by the crowns of other trees.
Coarse down woody material	Dead trees within a forest stand that have fallen and begun decomposing on the forest floor.
Crown cover or crown closure	The percentage of a given area covered by the crowns of trees.
Cutting units	Areas of timber proposed for harvest.
CYE	Cabinet Yaak Ecosystem.
Decadent	Deteriorating; when used in reference to stand condition there are inferences of the loss of trees from the overstory and of the presence of disease, or indications of loss of vigor in dominant trees so that the mean annual increment is negative.
Discounting	In economics, a method of accounting for the value of money over time, its ability to earn interest, so that costs and benefits occurring at different points in time are brought to a common date for comparison.
Disturbance	Any event which affects the successional development of a plant community (examples: fire, insect attack, windthrow, timber harvest).
Ditch relief	A method of draining water from roads using ditches and a corrugated metal pipe. The pipe is placed just under the road surface.
Diversity	The relative distribution and abundance of different plant and animal communities and species within an area.
DNRC	Montana Department of Natural Resources and Conservation
Dominant tree	Those trees within a forest stand that extend their crowns above surrounding trees and capture sunlight from above and around the crown.

Drain dip	A graded depression built into a road to divert water and prevent soil erosion.
Ecosystem	An interacting system of living organisms and the land and water that make up their environment ; the home place of all living thing, including humans.
Endangered species	Any plant or animal species which is in danger of extinction throughout all or a significant portion of its range. (Endangered Species Act of 1973).
Environmental Impact Statement (EIS)	A detailed statement prepared by the responsible official in which major government action which significantly affects the quality of the human environment is described, alternatives to the proposed action provided, and effects analyzed.
Environmental effects	The impacts or effects of a project on the natural and human environment.
Equivalent clearcut area (ECA)	The total area within a watershed where timber has been harvested, including clearcuts, partial cuts, road and burns. *Allowable ECA - The estimated number of acres that can be clearcut before stream channel stability is affected.* *Existing ECA – The number of acres that have been previously harvested taking into account the degree of hydrologic recovery that has occurred due to revegetation.* *Remaining ECA - The calculated amount of harvest that may occur without substantially increasing the risk of causing detrimental effects to stream-channel stability.*
Even-Aged Management	Deliberate planned actions that result in stands of trees of essentially the same age, growing together. Clearcut, shelterwood, or seed tree cutting methods produce even-aged stands.
Excavator piling	The piling of logging residue using an excavator.
Fir engraver	A major bark beetle pest of true firs throughout the western United States.
Fire regimes	Describes the frequency, type, and severity of wildfires. Examples include: frequent, non-lethal underburns; mixed severity fires; and stand-replacement or lethal burns.
Fire tolerant	A plant which has properties or characteristics which enable it to survive fire.
Forage	All browse and nonwoody plants available to wildlife for grazing.

Forest cover type	A descriptive classification of forestland based on the present vegetative species composition and/or industry (i.e., lodgepole pine, mixed conifer).
Forest improvement	The establishment and growing of trees after a site has been harvested. Associated activities include site preparation, planting, survival checks, regeneration surveys, and stand thinnings; road maintenance; resource monitoring; noxious weed management; and right of way acquisition on a State Forest.
Fragmentation (forest)	A reduction of connectivity and increase in sharp stand edges resulting when large contiguous areas of forest with similar age and structural character are interrupted through disturbance (e.g., stand-replacement fire, timber harvesting).
Habitat	The place where a plant or animal naturally or normally lives and grows.
Habitat effectiveness for Ungulates	The percentage of available habitat that is useable by ungulates during the non-hunting season (in comparison to potential ungulates use).
Habitat type	An aggregation of all land areas potentially capable of producing similar plant communities at climax.
Habitat Type Group	A category of habitat types with similar ecological amplitudes and environmental conditions.
Hazard reduction	The abatement of a fire hazard by processing logging residue with methods such as separation, removal, scattering, lopping, crushing, piling and burning, broadcast burning, burying, and chipping.
Hiding cover	Elk – Vegetation capable of hiding 90% of a standing adult elk from human view at a distance of 200 feet.
Historical forest condition	The condition of the forest prior to settlement by Europeans.
Indirect effects	Secondary effects which occur in locations other than the initial action or significantly later in time.
Interdisciplinary team	A team of resource specialists brought together to analyze the effects of a project on the environment.
Intermediate trees	A characteristic of certain tree species which allows them to survive in relatively low light conditions, although they may not thrive.
Intermittent stream	A stream which flows only at certain times of the year when it receives water from springs or from some surface source such as melting snow.

Irretrievable commitment of resources	Resources, such as harvested timber or other renewable natural resources, that are lost for a period of time. A stand of trees that is cut has been irretrievably lost (as opposed to irreversibly lost) because the stand can regenerate.
Irreversibly commitment of resources	Loss of resources that cannot be reversed except perhaps in the extreme long term, such as minerals, historical or archaeological resources; or vegetation and habitat lost to permanent roads. Irreversible also refers to the loss of future options.
Landscape	An area of land with interacting ecosystems.
Mature	On lands allocated for timber harvest, mature is defined as trees or stand that have reached rotation age, generally around 100 years.
MBF	Thousand board feet, referring to amount of lumber is in a tree or log. A volume measure for wood. On board foot = 12" x 12" x 1" of lumber.
MMBF	Million board feet.
Mitigation measures	An action or policy designed to reduce or prevent detrimental effects.
Multistoried stands	Timber stands with two or more distinct stories.
Nest site area (bald eagle)	The area in which human activity or development may stimulate abandonment of the breeding area, affect successful completion of the nesting cycle, or reduce productivity. It is either mapped for a specific nest, based on field data, or, if that is impossible, is defined as the area within a 0.25 mile radius of all nest sites in the breeding area that have been active within 5 years.
No-action alternative	The option of maintaining the status quo and continuing present management activities and/or not implementing the proposed project.
Non-forested area	A naturally occurring area where trees do not establish over the long term, such as a bog or avalanche chute.
Noxious weeds	Rapidly spreading plants which can cause a variety of major ecological impacts to agricultural and wildlands.
Obliteration	The reclamation and/or restoration of land to resource production from that of a transportation facility.
Old growth	Old growth is defined by DNRC as stands that are 150 years and older (140 for lodgepole pine) and that exhibit a range of structural attributes associated with old age.

Open road density	A measure of the amount of open roads per area of land, usually expressed as miles per square mile.
Overstory	The level of the forest canopy including the crowns of dominant, co-dominant and intermediate trees.
Patch	A discrete area of forest connected to other discrete forest areas by relatively narrow corridors; and ecosystem element (such as vegetation) that is relatively homogeneous internally, but differs from what surrounds it.
Potential nesting habitat (bald eagle)	Sometimes referred to as suitable nesting habitat, areas that have no history of occupancy by breeding bald eagles, but contain potential to do so.
Project file	A public record of the analysis process, including all documents that form the basis for the project analysis. The project file for the Keeler Mountain Timber Sale EIS is located at Libby Unit, DNRC office near Libby, Montana.
Recontour	A form of obliteration where the road prism is eliminated by pulling back fill material to re-establish the natural sideslope.
Record of decision	A concise public document disclosing the decision made following preparation of an EIS and the rationale used by the deciding officer to reach that decision.
Redds	The spawning ground or nest of various fish.
Regeneration	The renewal of a tree crop, whether by natural or artificial means. This term may also refer to the crop (seedlings, saplings) itself.
Regeneration harvest	Used in reference to clearcut, seedtree and shelterwood harvest methods which remove an existing stand to prepare a site for regeneration.
Reserve tree	Trees retained after the regeneration period (pole sized or larger) under the clearcutting, seed tree, or shelterwood methods.
Road reconstruction	The investment in construction activities that result in betterment, restoration, or in realignment of a road as defined below. *Realignment – Investment in construction activity that results in the new location of an existing road or portions thereof.* *Betterment – Investment in construction activity that raises the traffic service level of a road or improves its safety or operating efficiency.* *Restoration – Investment in construction activity required to rebuild a road to its approved traffic service level.*

Salvage harvest	The cutting of trees that are dead, dying, or deteriorating before they lose commercial value as sawtimber. The removed trees are generally overmature, damaged by fire, wind, insects, fungi or other injurious agencies.
Saplings	Trees 1.0 inches to 4.0 inches n diameter at breast height.
Sawtimber trees	Trees with a minimum dbh of 9 inches.
Scarification	The mechanized gouging and ripping of surface vegetation and litter to expose mineral soil and enhance the establishment of natural regeneration.
Scoping	The process of determining the extent of the environmental assessment task. Scoping includes public involvement to learn which issues and concerns should be addressed, and the depth of assessment that will be required. It also includes a review of other factors such as laws, policies, actions by other landowners, and jurisdictions of other agencies that may affect the extent of assessment needed.
Security	For wild animals, the freedom from the likelihood of displacement or mortality due to human disturbance or confrontation.
Security habitat (grizzly bears)	An area of a minimum of 2,500 acres that is at least 0.3 miles from trails or roads with motorized travel and high-intensity, non-motorized use during the non-denning period.
Seedlings	Live trees less than 1.0 inch dbh.
Sediment	In bodies of water, solid material, mineral or organic, that is suspended and transported or deposited.
Sediment yield	The amount of sediment that is carried to streams.
Sensitive species	Those species identified by the Regional Forester for which population viability is a concern as evidenced by significant current of predicted downward trends.
Seral	Refers to a biotic community that is in a developmental,transitional stage in ecological succession.
Shade intolerant	Describes tree species that generally can only reproduce and grow in the open or where the overstory is broken and allows sufficient sunlight to penetrate. Often these are seral species that get replaced by more shade-tolerant species during succession. In Libby Unit, shade-intolerant species generally include ponderosa pine, western larch, Douglas-fir, western white pine and lodgepole pine.
Shelterwood harvest	A regeneration method under an even-aged silvicultural system. A portion of the mature stand is retained as a source of seed site protection during the regeneration period.

Shade tolerant	Describes tree species that can reproduce and grow under the canopy in poor sunlight conditions. These species replace less shade-tolerant species during succession. In Libby Unit, shade-tolerant species generally include subalpine fir, grand fir, Douglas-fir, Engelmann spruce and western red cedar.
Sight distance	In the case of grizzly bears, sight distance refers to the distance at which 90 percent of a bear is hidden from view.
Silviculture	The art and science of managing the establishment, composition, and growth of forests to accomplish specific objectives.
Site preparation	A hand or mechanized manipulation of a harvested site to enhance the success of regeneration. Treatments are intended to modify the soil, litter, and vegetation to create micro-climate conditions conducive to the establishment and growth of desired species.
Slash	Branches, tops, and cull trees left on the ground following a harvest.
Snag	A standing dead tree or the portion of a broken off tree. Snags may provide feeding and/or nesting sites for wildlife.
Soft track	A specific type of ground based logging equipment that has wide tracks and an undercarriage that disperses the weight of the equipment over a larger surface area. The soft track equipment creates less ground pressure and helps to minimize soil compaction and displacement.
Stand	A community of trees or other vegetation uniform in composition, constitution, spatial arrangement, or condition to be distinguishable from adjacent communities.
Stand density	Number of trees per acre.
Stand replacing fire	A fire that kills most of all a stand, and causes a new stand to be started.
Stand structure	The horizontal and vertical arrangement of the vegetation in a stand.
Stocking	The degree of occupancy of land by trees as measured by basal area or number of trees and as compared to a stocking standard, which is an estimate of either the basal area or number of trees per acre required to fully use the growth potential of the land.
Stream gradient	The slope of a stream along its course, usually expressed in percentage indicating the amount of drop per 100 feet.
Stream channel stability	A classification system that utilizes ocular estimates of various channel, bank, and riparian area features to evaluate channel health.

Stumpage	The value of standing trees in the forest. Sometimes used to mean the commercial value of standing trees.
Substrate scoring	Rating of streambed particle sizes.
Succession	The natural series of replacement of one plant (and animal) community by another over time in the absence of disturbance.
Suppressed	The condition of a tree characterized by a low-growth rate and low vigor due to competition with overtopping trees.
Structual diversity	The variation in sizes and shapes of landscape elements, as well as diversity of pattern.
SFLMP	State Forest Land Management Plan
SMZ	Streamside Management Zone
Texture	A term used in visual assessments indicating distinctive or identifying features of the landscape depending on distance.
Thermal cover	For white-tailed deer, thermal cover has 70% or more coniferous canopy closure at least 20 feet above the ground, generally requiring trees to be 40 feet or taller. For elk and mule deer, thermal cover has 50% or more coniferous canopy closure at least 20 feet above the ground, generally requiring trees to be 40 feet or taller.
Timber-harvesting activities	In general, timber-harvesting activities refers to all the activities conducted to facilitate timber removal before, during, and after the timber is removed. These activities may include any or all of the following: - felling standing trees and bucking into logs - skidding logs to a landing - processing, sorting, and loading logs at the landing - hauling logs to a mill - slashing and sanitizing residual vegetation damaging during logging - machine piling logging slash - burning logging slash - scarification, site preparation - planting trees
Timber types	A descriptive classification of forest land based on present occupancy of an area by tree species (i.e., lodgepole pine, mixed conifer).
Underburn	Understory fuels treatment.
Understory	The trees and other woody species growing under a, more-or-less, continuous cover of branches and foliage formed collectively by the overstory of adjacent trees and other woody growth.

Uneven-aged stand	Various ages and sizes of trees growing together on a uniform site.
Ungulates	Hoofed mammals, such as mule deer, white-tailed deer, elk, moose, which are mostly herbivorous and many are horned or antlered.
U.S.F.W.S.	U.S. Fish and Wildlife Service.
Vigor	The degree of health and growth of a tree or stand.
Vigor class	The following vigor classes are based on the Libby Unit Stand Level Inventory: *Full vigor – The full vigor class is represented by open-growth trees. Crown closure has not occurred, and growth is optimal.* *Good-to-fair vigor – Crowns are closed at least in clumps; crown length is greater than 50 percent in young stands and greater than 33 percent in older stands. Growth has not yet slowed greatly.* *Fair-to-poor vigor – Crown ratios are poor. Growth and mortality are nearly balanced.* *Very poor vigor – Stands having very poor vigor are generally in a decadent condition due to insects, disease, stagnation, suppression or old age. Mortality is likely to exceed growth.*
Visual resource	The composite of landforms, water features, vegetative patterns and cultural features which create the visual environment.
Watershed	The region or area drained by a river or other body of water.
Water yield	The average annual runoff for a particular watershed expressed in acre-feet.
Water yield increase	An increase in average annual runoff over natural conditions due to forest canopy removal.
Windthrow	A tree pushed over by wind. Windthrows (blowdowns) are common among shallow rooted species and in areas where cutting or natural disturbances have reduced the density of a stand so individual trees remain unprotected from the force of the wind.
Winter range	A range, usually at lower elevation, used by migratory deer and elk during the winter months; usually better defined and smaller than summer ranges.
Yarding	A method of bringing logs into a roadside area or landing, for truck transport. Methods may include forms of skyline cable logging systems, ground-based skidding, balloon, helicopter, etc.

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APPENDIX A
STIPULATIONS AND SPECIFICATIONS KEELER MOUNTAIN TIMBER SALE

The stipulations and specifications for the action alternatives were identified or designed to prevent or reduce potential effects to resources considered in this analysis. In part, stipulations and specifications are a direct result of issue identification and resource concerns. This section is organized by resource.

Stipulations and specifications that apply to operations required by and occurring during the contract period will be contained within the Timber Sale Contract. As such, they are binding and enforceable. Stipulations and specifications relating to activities, such as hazard reduction, site preparation, and planting, that may occur during or after the contract period will be enforced by project administrators.

The following stipulations and specifications are incorporated to mitigate effects to resources involved with the action alternatives considered in this proposal.

WATERSHED AND FISHERIES

- Planned erosion-control measures include graveling portions of roads, constructing slash-filter windrows, planting grass seed, and closing and obliterating roads. Details for these control measures will be included in Appendix B of the Timber Sale Agreement.
- Streamside Management Zones (SMZs) will be delineated where they occur within or adjacent to harvest areas to protect areas adjacent to streams or lakes to maintain water quality.
- Culvert sizing for all road projects will be as recommended by DNRC hydrologist.
- Stream crossings, where culvert installations are planned, will have the following requirements, as needed, to meet Best Management Practices (BMPs) and protect water quality:

  - Slash-filter windrows will be constructed on the approach fills.
  - Filter-fabrics fences will be in place downstream prior to and during culvert installation.
  - Erosion-control fences will be installed on fill slopes at crossing sites and remain in place until the slopes stabilize and revegetate.
  - Diversion channels will be constructed and lined with plastic to divert streamflow prior to any in-channel operations.
  - Except for the equipment used to construct the crossing, stream crossing with any equipment is prohibited. The equipment used for the crossing construction will be limited to no more than 2 crossings.

- Brush will be removed from existing road prisms to allow effective road maintenance. Improved road maintenance will reduce sediment delivery.
- The contractor will be responsible for the immediate cleanup of any spills (fuel, oil, dirt, etc.) that will affect water quality.
- Fuel-leaking equipment will not be permitted to operate in stream-crossing construction sites.
- Included in the project proposal are the following pertinent recommendations of the Flathead Basin Forest Practices, Water Quality and Fisheries Cooperative Program Final Report.

The following numbers correspond to the numbering of recommendation items contained within the aforementioned document, included in pages **154** through **162** of the final report.

1) BMPs are incorporated into the project design and operations of the proposed project.

2) Riparian indicators will be considered in the harvest unit layout.

3) Management standards of the Streamside Management Zone Law (75-5-301 MCA) area used in conjunction with the recommendations of the study.

4) The BMP audit process will continue. This sale will likely be reviewed in an internal audit and may be picked at random as a Statewide audit site.

7) SMZs will be evaluated as a part of the audit process.

12) Watershed-level planning and analysis are complete. Logging plans of USFS, as reported to the Cumulative Watershed Effects Cooperative, are used.

15) DNRC will use the best methods available for logging and road building for this proposal.

17) DNRC requested inventory information from DFWP. DNRC's mitigation's plan for roads fits all recommendations for "impaired streams". Using "worst-case-scenario" criteria provides for conservative operations in this proposal.

18) Provisions in the Timber Sale Agreement address BMP's that are rigidly enforced.

29-34) DNRC has cooperated with DFWP for continuing fisheries work. DNRC will continue to monitor fisheries in the future as funding allows.

GRIZZLY BEARS

The following items are incorporated into this proposal:

- Contractors will be required to haul or store garbage in a safe place so bears will not be attracted to the area.
- The Forest Officer will immediately suspend any or all activities directly related to the proposed action, if necessary to prevent imminent confrontation or conflict between grizzly bears and humans or other threatened or endangered species and humans.
- Contractors will be prohibited, while working under contract, from carrying firearms onto closed roads.

WOLVES

A contract provision will be included to protect any wolf den or rendezvous site within the gross sale area that may be discovered during implementation of this proposal.

BIG GAME

Signs will be placed at the entrance of the Keeler Mountain area to:

inform users that the area is big game winter range,
request they not harass game animals with snowmobiles, and
request that pets are kept leashed or in direct control, so pets do not harass big game during the critical winter months.

Additional retention of existing vegetation will be done to provide security for big game in harvest units along open roads.

WILDLIFE TREES AND SNAG RETENTION AND RECRUITMENT

All existing high-quality wildlife trees/snags, such as large, broken-topped western larch, will be designated for retention and given special consideration during yarding operations to prevent loss.

Some large western larch (greater than 18" dbh) with characteristics that indicate they could become high-value snags (stem rot or physical defects) will be retained.

Clumps of larger grand fir that have stem rot will be retained to provide nesting habitat.

TOWNSEND'S BIG-EARED BAT

If any large aggregation of bats are discovered during the preparation or administration of this sale, the DNRC wildlife biologist will be informed immediately. Depending upon the nature of the report, the biologist will then coordinate efforts to determine the species. If Townsend's big-eared bats were determined to be present, further mitigative measures will be developed.

ROADS

Information on road-construction activities and road use associated with road-construction activities will be relayed to the general public.

BMP's will be incorporated in all planned road construction.

Signs will be placed at some critical intersections.

See **EROSION** section.

Under the action alternatives, many miles of existing roads will be closed by sign or physically closed; signs will also close some proposed roads. There will be a special emphasis on closing spur roads to snowmobiles by posting signs on the big game winter range.

VISUALS

Damaged residuals vegetation will be slashed.

The location, size and number of landings will be limited.

Disturbed sites along road right-of-ways will be grass seeded.

Pockets or strips of the residual stands along topographic breaks and roadsides will be retained to limit views into harvest units.

ARCHAELOLOGY

A contract clause provides for suspending operations if cultural resources are discovered; operations may only resume as directed by the Forest Officer.

A review of the project area was conducted by a DNRC archaeologist.

SOILS

COMPACTION

Logging equipment will not operate off forest roads unless soil moisture is less than 20% frozen to a depth that will support machine operations, or snow covered to a depth that will prevent compaction, rutting, or displacement.

Existing skid trails and landings will be used where their design is consistent with prescribed treatments and meets current BMP guidelines.

Designated skid trails will be required where moist soils or short steep pitches (less than 300 feet) will not be accessed by other logging systems. This will reduce the number of skid trails and the potential for erosion.

Where designated skid trails are required, timber on the trails will be felled and skidded before the remaining timber in a harvest unit is felled. This will define felling patterns, facilitate skidding on designated trails, and reduce the harvest unit area impacted by skidding equipment. Skidding plans are required to be in place prior to the start of logging operations.

Skid trail density in a harvest area will not exceed 15% of the total area.

SOIL DISPLACEMENT

To prevent displacement and erosion of topsoil, hard-track, ground-based skidding equipment will not be operated on steep slopes (greater than 40% sustained over 300 feet) unless mitigation measures assure displacement will be minimized.

Brush piling with dozers requires use of an approved brush rake.

Designated skid trails will be required in all areas where tractor yarding is proposed. Existing skid trails will be used when possible.

Lopping and scattering will be used for hazard reduction to retain woody debris onsite for nutrient cycling.

EROSION

Ground-skidding machinery will be equipped with a winchline to limit the equipment-operation areas.

Roads used by the purchaser will be reshaped and the ditches redefined following use to reduce surface erosion.

Drain dips and gravel will be installed on roads, as needed, to improve road drainage and reduce maintenance needs and erosion.

Some road sections will be repaired to upgrade the roads to design standards to reduce erosion potential and maintenance needs.

Applications of certified weed-free grass seed and fertilizer will be applied in at timely manner to all newly-constructed road surfaces and cut-and-fill slopes. Applications will also be applied to any existing disturbed cut-and-fill slopes and landings immediately adjacent to open roads. This will be done to stabilize soils and reduce or prevent noxious-weed establishment. This will include:

Seeding all road cuts and fills concurrent with construction.
Apply "quick-cover" seed mix within 1 day of work completion at wet-culvert installation sites.
Seeding all road surfaces and reseeding installation sites when the final bladding is completed for each specified road segment.

As directed by the Forest Officer, water bars, logging-slash barriers, and, in some cases, temporary culverts will be installed on skid trails where erosion is anticipated based on ground and weather conditions. These erosion-control features will be maintained and periodically inspected throughout the contract period or extension thereof.

AIR QUALITY

The first item is designed to prevent individual or cumulative effects during burning operations. The next 2 items are designed to reduce effects from burning operations.

Burning operations will be in compliance with the Montana Airshed Group reporting regulations and any burning restrictions imposed in Airshed 2. This will provide for burning during acceptable ventilation and dispersion conditions.

Dozer, landing, and roadwork debris piles will be covered to allow ignition to occur during spring when ventilation is good and surrounding fuels are wet. Covered piles are drier, ignite easier, burn hotter, and extinguish sooner due to higher relative humidity during spring. This will reduce dispersed (unentrained) smoke.

Maximize the amount of woody debris left on site. Fuels not burned do not produce smoke. If possible, larger fuels should be left and smaller fuels should be piles.

Consider other debris disposal methods for road construction and road-improvement projects, including lopping and scattering, trampling, hand piling, chipping, etc. Road right-of-way piles tend to be shaded by surrounding timber stands and do not dry out as well as piles in harvest units.

Dust abatement will be applied on the segments of roads in the Keeler Mountain Project area that are used during hauling and will benefit most from dust abatement.

An alternative disposal method for slash produced by road right-of-way, other than piling and burning, will be encourage.

NOXIOUS WEED MANAGEMENT

Surface blading to remove weeds before the seed-set stage may be required on roads affected by the proposal.

All tracked and wheeled equipment will be cleaned of noxious weeds prior to beginning project operations. The contract-administrating officer will inspect equipment periodically during project implementation.

Prompt vegetation seeding of disturbed roadside sites will be required. Roads used and closed as part of this proposal will be reshaped and seeded.

HERBICIDES

To further limit the possible spread of weeds, the following integrated weed-management mitigation measures of prevention and control will be implemented:

Road construction and skidding equipment will be cleaned of mud and weed plant parts prior to entering the site.

Disturbed roadsides and landings will be seeded with site-adapted grasses. So grass seeding will be effective, seeding will be completed concurrently with road construction.

Herbicide Application

To reduce risk to aquatic and terrestrial resources, the following will be required:

All herbicides will be applied by licensed applicators in accordance with laws, rules, and regulations of the State of Montana and Lincoln County Weed District.

All applications will adhere to Montana's Best Management Practices and the herbicide's specific label guidelines.

Herbicide application will not be general, but site specific, to areas along roads where noxious weeds area occurring. All no-spray areas will be designated on the ground before applications begin.

Herbicides will be applied to areas where relief may contribute runoff directly into surface water.

Application will be applied on calm, dry days to limit drift and possible surface movement off road prisms.

BIOLOGICAL ASSESSMENT

for

THREATENED, ENDANGERED AND PROPOSED SPECIES

in

MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

(MDNRC) KEELER MOUNTAIN FRTA EASEMENT

Three Rivers Ranger District
Kootenai National Forest

Prepared by:

David K. Dorman — Date
Wildlife Biologist

Norm Merz — Date
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Approved by:

Kimberly Johnson — Date
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John Carlson — Date
Forest Fish Biologist

BIOLOGICAL ASSESSMENT

for

MONTANA DNRC KEELER MOUNTAIN FRTA EASEMENT

THREE RIVERS RANGER DISTRICT
KOOTENAI NATIONAL FOREST

SUMMARY

SUMMARY OF FINDINGS

Threatened and Endangered Species

Implementation of the proposed federal action **MAY AFFECT BUT IS NOT LIKELY TO ADVERSELY AFFECT** grizzly bear, gray wolf, or bull trout during the operations phase (short term) and after project completion (long term).

Implementation of the proposed federal action **WILL HAVE NO EFFECT** on bald eagle, peregrine falcon, white sturgeon or water Howellia both during the short and long term.

Implementation of the proposed federal action **WILL NOT JEOPARDIZE** the continued existence of Canada lynx during the operations phase (short term) or after project completion (long term) **and will not result in destruction or adverse modification of critical habitat.**

CONSULTATION REQUIREMENTS FOR THREATENED AND ENDANGERED SPECIES

In accordance with the Endangered Species Act and its implementing regulations and FSM 2671.4, the Kootenai National Forest is required to obtain written concurrence from the US Fish and Wildlife Service (USFWS) with respect to this project.

NEED FOR RE-ASSESSMENT BASED ON CHANGED CONDITIONS

The findings of this biological assessment are based on the best data and scientific information available at the time of preparation. If new information reveals effects that may affect threatened, endangered or proposed species or their habitats in a manner or to an extent not considered in this assessment; if the proposed action is subsequently modified in a manner that causes an effect that was not considered in this assessment; or if a new species is listed or habitat identified that may be affected by the action, a revised biological assessment will be prepared.

INTRODUCTION

This Biological Assessment addresses the potential effects of the proposed federal action on all threatened, endangered and proposed wildlife known or suspected to occur within the area of influence of the proposed action. This assessment also considers the cumulative effects of other projects that will occur within the area of influence during the same time period.

Threatened, endangered, and proposed species are managed under the authority of the Federal Endangered Species Act (PL 93-205, as amended) and the National Forest Management Act (PL 94-588). The Endangered Species Act requires federal agencies to ensure that all actions which they "authorize, fund, or carry out" are not likely to jeopardize the continued existence of any threatened, endangered, or proposed species. Agencies are further required to develop and carry out conservation programs for these species. Conservation measures implemented to date for threatened, endangered, and proposed species by the Kootenai National Forest are on file at the Supervisor's Office.

DESCRIPTION OF PROPOSED ACTION

The State Of Montana Dept. of Natural Resources and Conservation (MDNRC) has requested a Forest Roads and Trails Act (FRTA) easement to haul logs from Section 36, T30N, R34W, (State owned). Their proposal calls for them to log approximately 2-6 million board feet of material from this section. Four alternatives are presently under consideration. Action alternatives would access (with a FRTA easement) via the S. Fk. Keeler end of forest service road (FSR) #4610, then FSR #4602 almost to state land, then 200 feet of new construction would be required on National Forest land to get to the state section. Road #4610 would need to be brought up to BMP standards, and Road #4602 would need some minor reconstruction.

Current plans are to sell/start the sale in the year 2000. The harvest is planned to take three years (2000-2003). During that time the roads would be open. Following logging, they plan to have 3 years (2004-2006) of post sale work when work would be performed behind closed gates. The most extensive of the three action alternatives will be d[illegible]d and analyzed below.

The direct federal action would consist of issuing a FRTA easement on 4.5 miles of existing road (FSR 4610 & 4602) to vehicle activity, bringing these roads up to BMP standards, and construction of about 200 feet of road on federal land.

The connected action would consist of 2.2 miles of road construction on state land and associated timber harvest. The timber sale would contain 3 units of regeneration harvest (32, 29 & 53 acre units) totaling 114 acres, one small salvage unit of 10 acres and one large group selection unit about 318 acres in size. The majority of the group selection unit would be skyline logged and a smaller portion helicopter logged. This would create small openings ranging between a quarter acre and five acres in size. After harvest, the two smaller regeneration harvest units would be grapple piled/burned, the larger regeneration unit would be underburned and the group selection

unit would receive a spring underburn to control fuel buildup and closer align this ecosystem with its historic conditions (see appendix map for proposed units).

Total acres in Project Area	640
Percent of BMU 03 Treated	0.8%
Total acres treated	442
Total miles road construction	2.2

Treatment methods in acres:	
Regeneration Harvest	114
Group Selection Harvest	318
Salvage Harvest	10

THREATENED, ENDANGERED AND PROPOSED SPECIES LIST

The Endangered Species Act currently lists the following endangered, threatened and proposed wildlife species that could be potentially affected by the project. This list is presented below with site specific information on occurrence relative to the project area. The grizzly bear and the bald eagle are currently designated threatened; gray wolf and peregrine falcon are designated endangered; and the Canada lynx has been proposed as threatened.

THREATENED, ENDANGERED, AND PROPOSED WILDLIFE SPECIES POTENTIALLY AFFECTED BY THE PROPOSED PROJECT

SPECIES	KEY HABITAT COMPONENT	OBSERVED IN PROJECT AREA	HABITAT IN PROJECT AREA	COMMENTS
Grizzly Bear	Winter: Dens > 6000' Summer: Security = ORD < 0.75	No	Yes	No confirmed sightings within BMU 3 recently.
Bald Eagle	Open water > 40 acres, fish, ungulate winter range	No	Yes	Known to inhabit the Lake Creek corridor in summer, one known nest 2.5 miles SE of project area.
Peregrine Falcon	Cliffs taller than 150' Abundant birds for prey	No	Yes	No suitable nesting habitat in the project area.
Gray Wolf	Spring: Dens < 4000' Winter: Ungulate winter range	No	Yes	Wolves possibly travel through and hunt in the general area.
Canada Lynx	forage: young regen patches with dense Lpp >4,000 ft in elevation	No	No	No known recent occurrences in project area.

GRIZZLY BEAR (Ursus arctus horribilus)

Description of Population and Habitat Status

Portions of two grizzly bear recovery zones exist on the Kootenai National Forest: the Northern Continental Divide Ecosystem (NCDE) and the Cabinet-Yaak Ecosystem (CYE). The NCDE would not be affected by this proposal. Approximately 70 percent of the CYE is located on the Kootenai, consisting of 17 BMUs generally in the western half of the Forest. BMU # 03 within the CYE would be potentially affected by implementation of this proposal. Basic grizzly bear ecology, recovery zones, and recovery goals are described in the Grizzly Bear Recovery Plan (U.S. Fish and Wildlife Service 1993), hereby incorporated by reference.

Grizzly bear habitat on the Kootenai is described in the Kootenai Forest Plan (USDA Forest Service 1987) and by Christensen and Madel (1982). Grizzly bear populations on the Forest are discussed by Kasworm and Thier (1993). These documents are incorporated by reference.

Recent information (McMaster, 1995B) indicates an increase in the estimated total number of bears in the CYE from 12 (1993) to 18 (1994). Wayne Kasworm (1996) indicates that this population estimate has been revised upward to 35-40 bears within the CYE. Data also suggests that successful reproduction is occurring and that these young (particularly DJ's offspring) have survived and reproduced over the term of the ongoing Yaak study. The overall mortality rate for the entire CYE has decreased during the last twelve years.

Actual use by grizzly bear within BMU 3 is largely unknown. Successful trapping in conjunction with ongoing research has never been accomplished in this area therefore no radio collar locations exist and specific information on bear use is lacking. Credible sightings are reported a couple times per decade by local people and this indicates a low level of bear use within BMU 3.

Interim Grizzly Bear Rule Set

On December 1, 1998 the subcommittee for the Selkirk/Cabinet-Yaak Grizzly Bear Recovery Area adopted a new set of guidelines for grizzly bear management which will be applied to all public land administered by the US Forest Service within this recovery area. This new set of rules applies for a three year period beginning in January 1999 and emphasizes restricting public road access in order to create high quality bear habitat. The following analysis uses regulations adopted in this new Access Management Rule Set.

Analysis of Direct, Indirect, and Cumulative Effects

The goal for grizzly bear management on the Kootenai National Forest is to provide sufficient quantity and quality of habitat to facilitate grizzly bear recovery. An integral part of the goal is to implement measures within the authority of the Forest Service to minimize human-caused grizzly bear mortalities.

This goal is accomplished by achieving certain objectives relative to grizzly bear recovery (Harms 1990). A number of measures are used to gauge whether the objectives are being met.

These measures include Forest Plan standards and guidelines and other measures developed through consultation with USFWS. The following analysis describes the existing conditions and potential effects, including cumulative effects of the proposed action by examining how these measures are implemented in order to achieve objectives as currently understood relating to grizzly bear recovery. The existing conditions in the following analysis apply to bear year 2000.

Objective 1. Provide adequate space to meet the spatial requirements of a recovered grizzly bear population.

A) Habitat Effectiveness: Habitat effectiveness (HE) should be maintained equal to or greater than 70% of the BMU.

The existing habitat effectiveness within BMU 3 is 77.9%. During project activities, HE would decrease to 75.4%. This meets the standard.

B) Open Road Density: The open road density will be displayed at the BMU and BAA scales. BMUs should maintai · ORDs equal to or less than 0.75 and BAAs should maintain ORDs equal to or less than 0.75 unless a major activity is in progress.

This BMU is approximately 119 square miles in extent and located entirely on the Three Rivers Ranger District. Road density is calculated on situation 1 land which is 113.4 square miles within the BMU. The ORD by BAA is displayed below.

EXISTING AND DURING OPEN ROAD DENSITIES IN BMU 03

BMU 03		EXISTING		DURING	
BAA	SITUATION 1 (SQ.MILES)	OPEN ROADS (MILES)	ORD (MI./SQ.MI.)	OPEN ROADS (MILES)	ORD (MI./SQ.MI.)
3-1	18.68	15.02	0.80	18.04	0.97
3-2	25.37	12.40	0.49	12.40	0.49
3-3	10.02	0.0	0.00	1.06	0.11
3-4	20.17	20.84	1.03	21.92	1.09
3-5	14.49	6.30	0.44	6.30	0.44
3-6	24.63	2.68	0.11	2.68	0.11
Total BMU	113.36	57.24	0.51	62.40	0.55

The existing situation displayed above represents bear year 2000. BAA 3-1 currently has an ORD higher than the 0.75 standard and is not active with a major project. BAA 3-4 also has a higher ORD than 0.75 but is currently active with a major project, the Bull Lake Subdivision. During the proposed project, two BAAs (3-1 & 3-4) will have higher ORDs than 0.75 and both of these BAAs would be active with this proposal. The MDNRC road use permit and connected harvest would be active in BAAs 3-1, 3-3 and 3-4. Although existing conditions within BAA 3-1 does not meet standards, ORDs within all BAAs would be within acceptable levels, given the level of displacement habitat (in the form of core) available during all phases of planned harvest operations. The existing ORD within BMU 3 is well below the 0.75 standard and would remain well below the standard both during and after the proposed project.

C) Displacement Areas: Displacement areas are measured within BMUs and defined as core habitat. There is no standard but the general goal is 55% or more. The new Interim Rule Set states that no net loss of core would occurr on federal ownership.

Core areas are considered functional displacement areas and currently total 61% of the BMU. A slight reduction in core habitat would occur on state land during this project and could decrease core habitat to 60.4% within the BMU. This core model predicts all units to be active within the same bear year; it is not feasible to attempt to model individual unit activity by year. In reality, units would probably be harvested during different years causing a maximum reduction of about 0.2% core during any one year. This core reduction would take place on spring range in the summer or fall time period which would not affect bear usage as actual bear activity would be concentrated in higher elevation berry producing habitat types at this time. Core habitat would remain well above the goal of 55% within BMU 3.

Objective 2. Manage for an adequate distribution of bears across the ecosystem.

Grizzly bear habitat on the Kootenai National Forest is analyzed for four standards to determine if the distribution objective is being met:

A) Opening size: Proposed timber harvest units, either individually or in combination with existing unrecovered units should normally be designed to be ≤40 acres. Where the 40 acre limitation is exceeded for justifiable reasons, no point in the resultant opening should be more than 600 feet from cover (i.e. maximum 1200 foot opening width).

One opening created by this proposed harvest would be about 53 acres. However, there is currently good vegetation development providing hiding cover around the perimeter of the proposed cut. All portions of the proposed harvest unit would remain less than 600 feet to cover due to the shape of the unit in relation to the surrounding vegetation.

B) Movement corridors: Unharvested corridors ≥600 feet in width should be maintained between proposed timber harvest units and between proposed and unrecovered existing harvest units or natural openings.

Movement corridors of 600 feet in width would remain available to animals around the perimeter of the proposed harvest and between units except for one area. In the connected action of harvest activities on state land, one corridor between two regeneration units would neck down to about 300 feet wide for a distance of about 600 feet. This is not expected to deter movement between harvest units.

C) Seasonal components: Schedule proposed major activities to avoid known spring habitats during the spring-use period (April 1 to June 15) and known denning habitats during the denning period (November 15 to April 15.)

No den sites are known to exist within the proposed harvest area. Potential spring use areas for bears does exist within the group selection unit on the east side of Keeler Mtn. Harvest activity/road construction in this area would not occur during the spring use period. The group selection unit on the east face of Keeler Mtn. would have to be burned in the spring when burn

prescriptions qualify. This is spring bear range but disturbance during burning would be brief and necessary; no adverse effect to grizzly bear through disturbance in spring habitat is expected because this would be the only known activity planned to occurr during the spring within the BMU. Ecologically, there should be a beneficial effect to the bear by increasing food quality/quantity and also by enhancing the long term sustainability of this habitat.

Objective 3. Manage for an acceptable level of mortality risk.

Kasworm and Thier (1993) list documented grizzly bear mortalities on the Kootenai National Forest from 1950 to present. Most human-caused grizzly bear mortalities on the Kootenai have resulted from interactions between bears and big game hunters (Kasworm and Manley 1988). Grizzly bear vulnerability to human-caused mortality is partially a function of habitat security. Therefore, mortality can be partially managed by the application of standards which are designed to maintain or enhance habitat security. These standards will be achieved by meeting objectives 1, 2 and 6.

Objective 1 is met by this proposal; components 2-B and 6-D are explained below.

Objective 2-B - The proposal reduces one travel corridor to 300 feet in width in order to harvest even aged mature lodgepole pine. This pattern of openings created by harvesting lodgepole pine is likely very similar to historic patch sizes created by stand replacing wildfires across the landscape. The long term result would be to increase the probability of maintaining travel cover within this travel corridor because fuel buildup would be reduced in neighboring stands which are nearing their recycle (wildfire) mode. Mortality risk is predicted to remain unchanged in the short term as adequate escape cover would remain available to grizzly bear close to the harvest opening. Mortality risk should continue to decline in the long term as the USFWS continues and expands its educational programs to the public.

Objective 6-D - Existing core would be reduced from 61% to approximately 60.8% during any one bear year by this proposal. This temporary reduction in core would be on state land within the Keeler Mtn. section. This core reduction would take place on spring range in the summer or fall time period which would not affect bear usage as actual bear activity would be concentrated in higher elevation berry producing habitat types at this time. Core would remain above the goal of 55% and should be adequate for a BMU in which there is very little evidence for actual bear activity. Mortality risk would remain unchanged as a spring restriction would be enforced.

It is important to note that human-caused grizzly bear mortality is also a function of other factors, such as the regulation of big game hunting, which are beyond the authority of the Forest Service to control. Regulation of hunting is the responsibility of the State of Montana.

Objective 4. Maintain/improve habitat suitability with respect to bear food production.

This will be achieved by meeting Objectives 1 and 2.

Objective 1 is met by this proposed action; component 2-B is explained below.

Objective 2-B - The proposal reduces one travel corridor to 300 feet in width in order to harvest even aged mature lodgepole pine. This pattern of openings created by harvesting lodgepole pine

is likely very similar to historic patch sizes created by stand replacing wildfires across the landscape. The long term result would be to increase the probability of maintaining travel cover within this travel corridor because fuel buildup would be reduced in neighboring stands which are nearing their recycle (wildfire) mode. Several hundred acres would be burned by this proposal and this should increase the quantity and quality of available bear foods especially in the group selection unit which is on spring range.

Objective 5. Meet the management direction outlined in the Interagency Grizzly Bear Guidelines (51 Federal Register 42863) for management situations 1, 2, and 3.

This will be achieved by meeting Objectives 1, 2, 3 and 4. The proposed activities meet the intent of all Forest Plan standards and guidelines as amended through consultation with the USFWS and, therefore, the Interagency Grizzly Bear Guidelines would be met.

Objectives 1-4 have been fully discussed under previous objectives. The proposed action meets the intent of all Forest Plan standards and guidelines as amended through consultation with the USFWS and, therefore, the Interagency Grizzly Bear Guidelines are met.

Objective 6. Meet the interim management direction specified in the July 27, 1995 Biological Opinion Amendment which defines incidental take levels.

A) Open Road Density: Manage the density of open roads within the Forest Plan standards.

The existing condition in BAA 3-1 (ORD = 0.80) does not meet current standards because of public access considerations on the western edge of Troy. All BAAs affected by this proposal would meet current standards or have adequate displacement habitat (in the form of core) available during the proposed activity. The BMU meets standards in the existing situation and during the proposed action.

B) Open Motorized Trail Density: Do not increase the density of open motorized trails within the affected BMU.

The proposed project will have no effect on existing motorized trail density.

C) Total Motorized Access Route Density (TMARD): Manage all motorized access routes in the affected BMU to avoid a net increase over the existing density.

The proposed action would construct 2.2 miles of new road mostly on state land. The Three Rivers Ranger District proposes to allow the state to decommission 2.4 miles of road on federal land near the state section to mitigate new road construction on state land. The following roads would be decommissioned: road 14334 past the 14334 B spur junction = 1.18 miles, road 4641 past the 14334 junction = 1.03 miles, and the 4641A spur past the 4641 junction = 0.19 miles. This would result in a net decrease of 0.2 road miles and thus comply with this objective of no net increase in TMARD.

D) Existing Core Area: Manage the Existing Core Area within the affected BMU to avoid a net decrease.

The existing core area is 61% of BMU 03. Existing core would be reduced to 60.4% (core could possibly not fall below 60.8% in any one bear year) by this proposal. This temporary reduction in core would be on state land within the Keeler Mtn. section. This core reduction would take place on spring range in the summer or fall time period which would not affect bear usage as actual bear activity would be concentrated in higher elevation berry producing habitat types at this time. Although a slight reduction in core does not meet this objective, core would remain above the goal of 55% and should be adequate for a BMU in which there is very little evidence for actual bear activity.

Statement of Findings

The proposed federal action **MAY AFFECT BUT IS NOT LIKELY TO ADVERSELY AFFECT** grizzly bear or its habitat during project implementation (short term) or after project completion. This determination is based on the conclusion that the proposed federal action and the connected state action comply with the intent of standards designed to maintain grizzly bear habitat. Reduction of one travel corridor below the normal 600 feet width is not considered significant. A slight reduction in core habitat is predicted but core should remain well above the goal of 55%.

Potential Measures for Removing, Avoiding, or Compensating for Adverse Effects

To mitigate new road construction on state land, 2.4 miles of existing road on federal land would be decommissioned (see 6-C above for specifics). No additional mitigation or compensation for adverse effects is required.

GRAY WOLF (Canis lupus)

Description of Population and Habitat Status

The gray wolf on the Kootenai NF is covered under the Northern Rocky Mountain Wolf Recovery Plan (USFWS 1987). The plan identifies 3 recovery areas with a recovery goal of 10 breeding pairs for 3 successive years in each area. Presently (Bangs 1998a & b) each of the three areas have at least 8 breeding pair. The Kootenai NF lies primarily in "management zone III" between the Northwest Montana and Central Idaho recovery areas, but a small portion of the Forest is in the NW Montana recovery zone. Because wolves have defined habitat as any lower elevation area that supports white-tailed deer (Bangs 1998a pg.2) (mostly in management zone III) and because the habitat within the Northwest Montana recovery area is fully occupied (Bangs 1998a pg.6), wolf recovery in NW Montana is currently promoted in any area where there are not chronic conflicts with livestock (Bangs 1998a pg.2). Presently there are about 75 adult wolves in 7-9 packs and up to 40 pups in NW Montana (Bangs 1998b pg.1).

There are currently 5 packs that use parts of the Kootenai National Forest. The Murphy Lake and Grave Creek packs' territories are primarily within the Forest boundary. Their territories cover a large area in the east half of the Forest, both in and outside the NW recovery area. The Little Wolf pack territory extends into the south eastern part of the Forest. Two other packs

(Thompson River and Marion) include a smaller portion of the Kootenai NF within their territory but largely range south of the forest boundary. The Pleasant Valley pack (which only lasted about 2 years) was terminated in the spring of 1999 due to continued cattle depredation. In addition, sightings of other wolves (scattered throughout much of the Forest) are becoming more common.

The two major parameters of wolf habitat that provide survival and recovery values are: 1) an adequate prey base and 2) minimizing mortality risk by providing habitat security. Additional parameters essential for recovery include special habitats such as dens and rendezvous sites. Ungulate populations are currently at historically high levels on the Kootenai, providing an abundance of prey for wolves. Management steps have also been taken in recent years to significantly improve habitat security for wolves and other wildlife species. For example, motorized use is currently restricted on over 53% of the road system on the Kootenai National Forest. Known den and rendezvous sites have also received protection.

Analysis of Direct, Indirect, and Cumulative Effects

The proposed project is not located near known or suspected wolf den or rendezvous sites. There would be no anticipated adverse effects on wolves using these habitat components. Current road management plans would remain in effect for the BMU (except for a short time during harvest) and the BMU has a low overall open road density which should continue to sponsor wolf recovery.

Potential effects to the gray wolf are thought to be very similar to the effects predicted for the grizzly bear in this analysis. Because white-tailed deer are so numerous across the Forest, prey for the wolf is not considered a limiting factor. Like the grizzly bear, maintaining large tracts of land secure from human disturbance (habitat effectiveness) is probably the most important habitat component considered necessary for establishing/maintaining a viable population of gray wolves on the Kootenai National Forest. This management strategy initiated primarily for grizzly bear recovery should also insure gray wolf recovery.

Statement of Findings

The proposed federal action **MAY AFFECT BUT IS NOT LIKELY TO ADVERSELY AFFECT** the gray wolf or its habitat during project implementation (short term) or after project completion. This determination is based on the conclusion that the proposed federal action would not detrimentally affect the ungulate prey base, special habitats, such as den and rendezvous sites would not be affected, and that maintaining habitat effectiveness standards on a BMU basis would insure adequate security for the wolf.

Potential Measures for Removing, Avoiding, or Compensating for Adverse Effects

The analysis performed in conjunction with this Biological Assessment identified no adverse effects on the gray wolf. No mitigation or compensation for adverse effects is required.

PEREGRINE FALCON (Falco peregrinus)

Description of Population and Habitat Status

Peregrine falcon nesting habitat consists of cliffs ledges, rock outcrops, and talus slopes, frequently overlooking a body of water. Peregrines feed almost exclusively on birds. Open habitats such as marshes and river bottoms constitute their primary feeding areas. Peregrine falcons are sensitive to human disturbance at nest sites. No nest sites are currently known on the KNF.

Peregrine falcons are known to migrate through the Kootenai National Forest, but sightings are rare. Findings from an aerial survey conducted by the Peregrine Fund suggest that the availability of suitable nest sites on the Kootenai National Forest is limited (B. Summerfield, Pers. Comm.).

There are no known current or historic nest sites within the project area; preferred nest locations consisting of rock cliffs do not occur within the project area. Also, the existing avian prey base is likely inadequate to support a breeding pair. It is unlikely that the project area could support anything more than transient use by peregrine falcons.

Analysis of Effects, Including Cumulative Effects

The proposed federal action is not expected to adversely affect the existing potential of the analysis area to support occasional peregrine falcon use. The action would not affect preferred foraging habitat or the prey base (which are both absent from the analysis area). Likewise, the proposed activities would have no effect on nest sites as no potential nesting habitat exists within the analysis area.

Statement of Findings

The proposed federal action will have **NO EFFECT** on peregrine falcon (directly, indirectly or cumulatively) or its habitat. This conclusion was derived from the fact that preferred nesting and foraging habitat is absent from the analysis area.

Potential Measures for Removing, Avoiding, or Compensating for Adverse Effects

The analysis performed in conjunction with this Biological Assessment identified no adverse effects on the peregrine falcon or its habitat. No mitigation or compensation for adverse effects is required.

NORTHERN BALD EAGLE (Haliaetus leucocephalus)

Description of Population and Habitat Status

Habitat management guidelines from the Montana Bald Eagle Management Plan (MBEMP 1986, MBEWG 1990) serve as the standard for northern bald eagle habitat management on the Kootenai National Forest. The project area falls within Zone 7, the Upper Columbia Basin Bald

Eagle Management Zone. Within the management zone, the MBEMP recognizes 3 categories of essential habitat: currently occupied nesting habitat, potential nesting habitat, and wintering habitat.

Bald eagle nest territories are typically associated with mature forest in close proximity to large bodies of water that support an abundance of fish and waterfowl (Anthony et al. 1982, Wright and Escano 1986). Wright and Escano (1986) found that nests in Montana were within 1.0 mile of a lake or reservoir greater than 40 surface acres, or a stream greater than fourth order. Nest sites are typically located in open-canopied, uneven-aged mature or old growth forest (Wright and Escano 1986, Jensen 1988). Bald eagles select nest trees which are large (mean dbh = 35in., mean height = 110ft.), with open crowns and sturdy horizontal limbs capable of supporting the nest (Jensen 1988).

The management goal for Montana is to provide secure habitat as well as increase population levels in specific geographic areas to delist the species. The population goal for Montana is 99 breeding pairs. There are 22 active territories in and around the KNF. Five nesting territories are located on the Three Rivers Ranger District. All are associated with large bodies of water with adequate fisheries for hunting.

Montana ranks among the top 15 states for wintering bald eagles. Bald eagles wintering in Montana tend to congregate near bodies of water, including major river drainages and large lakes. Open water and food availability dictate areas of use throughout the winter months. Upland areas may receive considerable use when carrion is available. During migration and at wintering sites, eagles that concentrate on locally abundant food tend to roost communally. Communal roosts usually are located in stands of mature or old growth conifers or cottonwoods, and roosts may be several miles from feeding sites. The Kootenai National Forest typically receives substantial use by wintering eagles between mid-November and mid-February. Peak concentrations typically occur in late November along the Kootenai River and sometimes approach 200 birds.

There is one active eagle nest on the north end of Bull Lake about 2.5 miles southeast of the proposed action. This eagle nest has remained active and consistently productive through the years (almost 20 years of monitoring) in spite of large amounts of timber harvest, residential development, and intensive recreational activity much closer to the nest site than the current proposed action.

Analysis of Effects, Including Cumulative Effects

There would be no effect to eagle nest sites since none occur in the project area. Primary use of the project area is occasional use scavenging for carrion during winter migration periods. Because no activities are planned during this winter period, no effect to the eagle is anticipated.

Statement of Findings

The proposed federal action will have **NO EFFECT** (direct, indirect or cumulative) on bald eagle or its habitat. This conclusion is based on the fact that no nest sites or important communal roosting areas are known to exist within the project area.

Potential Measures for Removing, Avoiding, or Compensating for Adverse Effects

The analysis performed in conjunction with this Biological Assessment identified no adverse effects on the northern bald eagle. No mitigation or compensation for adverse effects is required.

CANADA LYNX *(Lynx canadensis)*

Description of Population and Habitat Status

The lynx was proposed threatened in 1998 and is currently under review pending formal status. It is a furbearer with restricted limit in the State of Montana and the current allowable trapping quota of lynx in Montana is two individuals. A major lynx research project is currently underway in the Yaak and is being partially funded by the Kootenai National Forest with additional technical support being contributed by the Three Rivers Ranger District. This multi-year project will hopefully contribute significantly to our knowledge of local lynx populations.

Preferred lynx habitat is lands above 4,000 feet elevation within northwestern Montana. Within this elevation band, dry, open, rocky areas are not thought to be used extensively by lynx due to their open character and lack of prey species. Lynx home ranges vary from 5-20 square miles based on age, gender, and availability of prey.

Lynx require a mosaic of forest conditions: early successional forest for hunting, mesic mature forest for denning, and forested cover for travelways (Koehler 1990). Lynx prey almost exclusively on snowshoe hares, but will also hunt mice, voles, red squirrels and grouse, especially during lower hare abundance. Foraging habitat for lynx is tied strongly to habitat for hares. In eastern Washington, hare forage in winter consists of dense (greater than 3,000 stems/acre) sapling-sized lodgepole pine that provides browse, bark and needles (Koehler 1990), as well as cover. When these foods are under deep snow, hares rely on taller willows and birches and sapling conifers (Koehler and Brittell 1990). In summer, hares feed on succulent forbs, grasses and small shrubs under sufficient cover. These conditions typically occur in old burns, areas of blow down timber, and older, regenerated harvest units. Middle and older stands often support lower hare densities, and are used more for travel.

Koehler and Brittell (1990) have characterized denning habitat in Washington. Denning sites are typically found on north and northeast aspects in lodgepole pine, Engelmann spruce, and subalpine fir forests older than 200 years, with a high density of down-fall logs. Down logs and stumps provide cover for kittens and may be the most important component of denning habitat. Denning stands may be as small as one acre, and are often located in close proximity to forage areas.

Lynx generally avoid xeric forest types and open meadows, as well as new burns and areas of human disturbance. Lynx avoid foraging in or crossing openings that are greater than 300 feet from cover (Koehler and Brittell 1990). Since lynx travel with kittens to areas of abundant prey or to avoid disturbances such as those associated with open roads, corridors between suitable denning areas are important. Lynx have been documented to prefer ridges and saddles as movement corridors (Koehler 1990). Lynx are vulnerable to trapping and trapping can be a major cause of adult and juvenile mortality. Roads provide access for trappers.

The Project Area is outside of lynx management areas recently established on the Kootenai National Forest. Keeler Mountain is fairly small in extent, isolated from a high elevation ridgeline connection, and largely made up of very steep, dry, rocky Douglas fir ecosystems which are not very good lynx habitat. For these reasons, potential direct and indirect effects to lynx habitat components are predicted to be minimal.

In a larger sense, cumulative effects to overall lynx habitat security is an important consideration for lynx populations especially where road construction is proposed and open road densities are the most important single factor in this regard. This Project Area is within the CYE grizzly bear recovery zone which maintains low ORDs during the active bear season. This would provide lynx with secure spring, summer and fall habitat and result in very low mortality risk associated with human predation. During the winter however, most of the CYE grizzly bear recovery zone is open to use by snowmobiles and could be accessed by trappers which could result in trap mortality. This would result in high mortality risk during the winter trapping season.

Analysis of Effects, Including Cumulative Effects

Lynx habitat components such as denning, forage and travel cover would not be affected by this proposal because the Project Area does not contain very good lynx habitat and is outside our Lynx Management Units.

Cumulative effects from road construction could enhance access for trappers and thus reduce overall habitat security for lynx. The proposed action however, contains road decommissioning to balance road construction which would result in a net reduction of 0.2 miles of road and thus would not result in increased access for trappers. Habitat security will continue to be high during the spring/summer/fall (low ORDs) and low in the winter (high ORDs). Thus the overall mortality risk will continue to be medium.

The cumulative effects of past and present land uses and natural random events have been incorporated into the analysis of current habitat within the project area. No cumulative adverse effects to lynx from implementation of the proposed action have been identified during this analysis.

Reasonably foreseeable actions which will take place within the analysis area include: routine road maintenance, firewood gathering, recreational activities, hunting/trapping, etc. These activities would offer some level of local disturbance but are not anticipated to cause adverse effects to the lynx or its habitat parameters.

Statement of Findings

Implementation of the proposed action **Will Not Jeopardize** (direct, indirect or cumulative) the continued existence of Canada lynx during the operations phase (short term) or after project completion (long term) **and will not result in destruction or adverse modification of critical habitat.** Action alternatives do not adversely affect foraging habitat or mortality risk which seem to be two of the limiting factors regarding lynx populations within the Kootenai National Forest.

Potential Measures for Removing, Avoiding, or Compensating for Adverse Effects

The analysis performed in conjunction with this Biological Assessment identified no adverse effects on the lynx. No mitigation or compensation for adverse effects is required.

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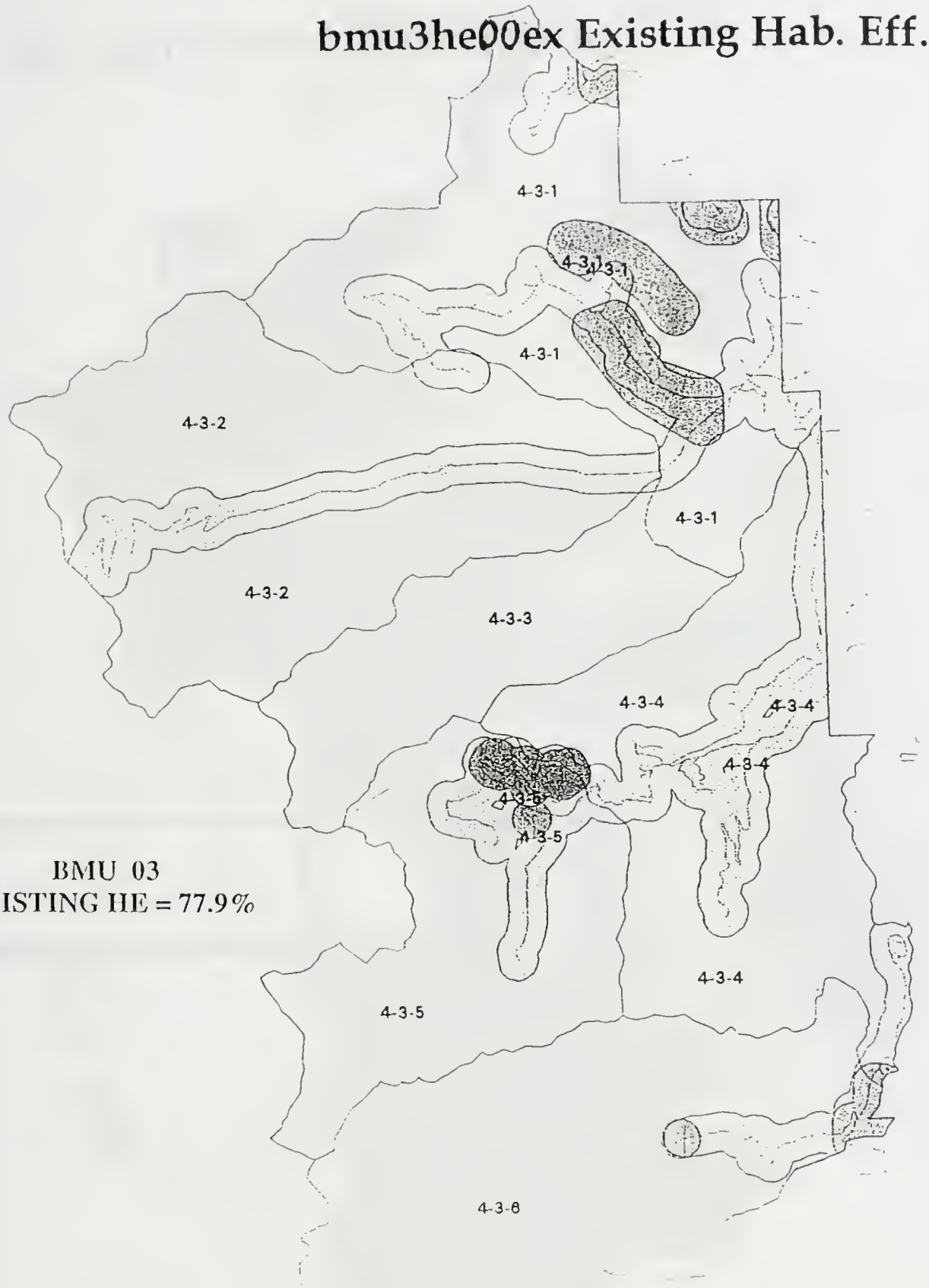
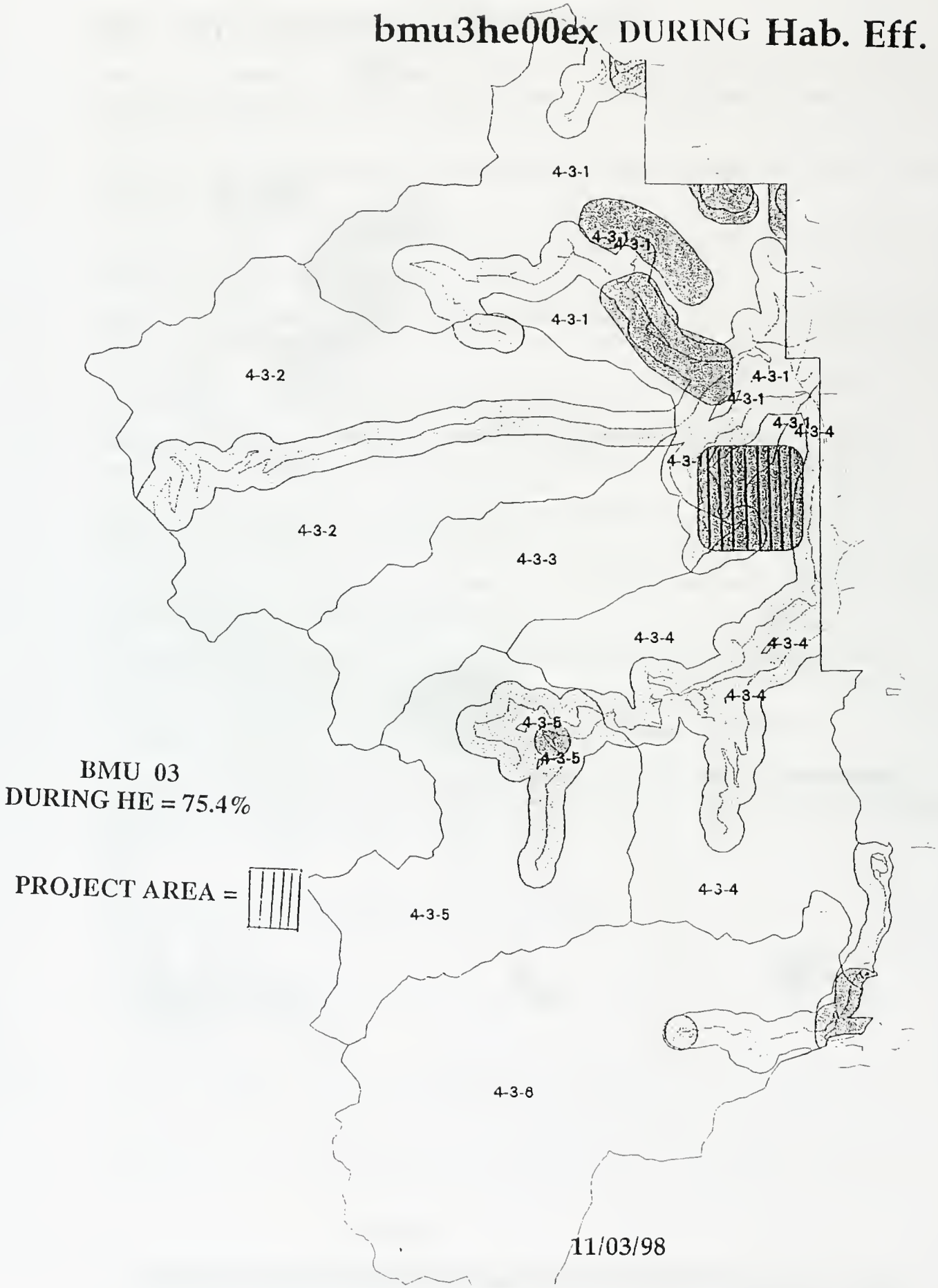
bmu3he00ex Existing Hab. Eff.



BMU 03
EXISTING HE = 77.9%

10/27/98

bmu3he00ex DURING Hab. Eff.

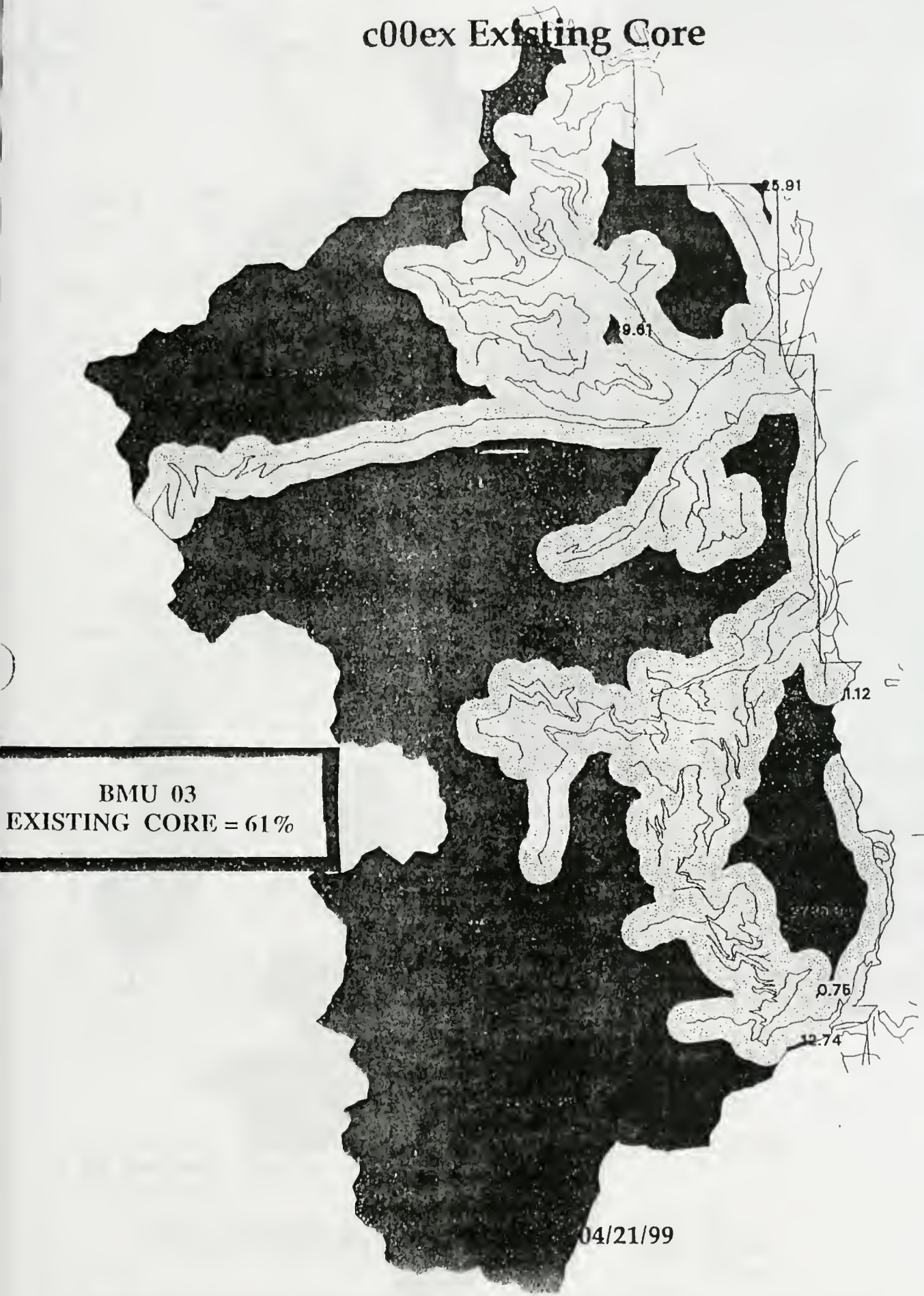


BMU 03
DURING HE = 75.4%

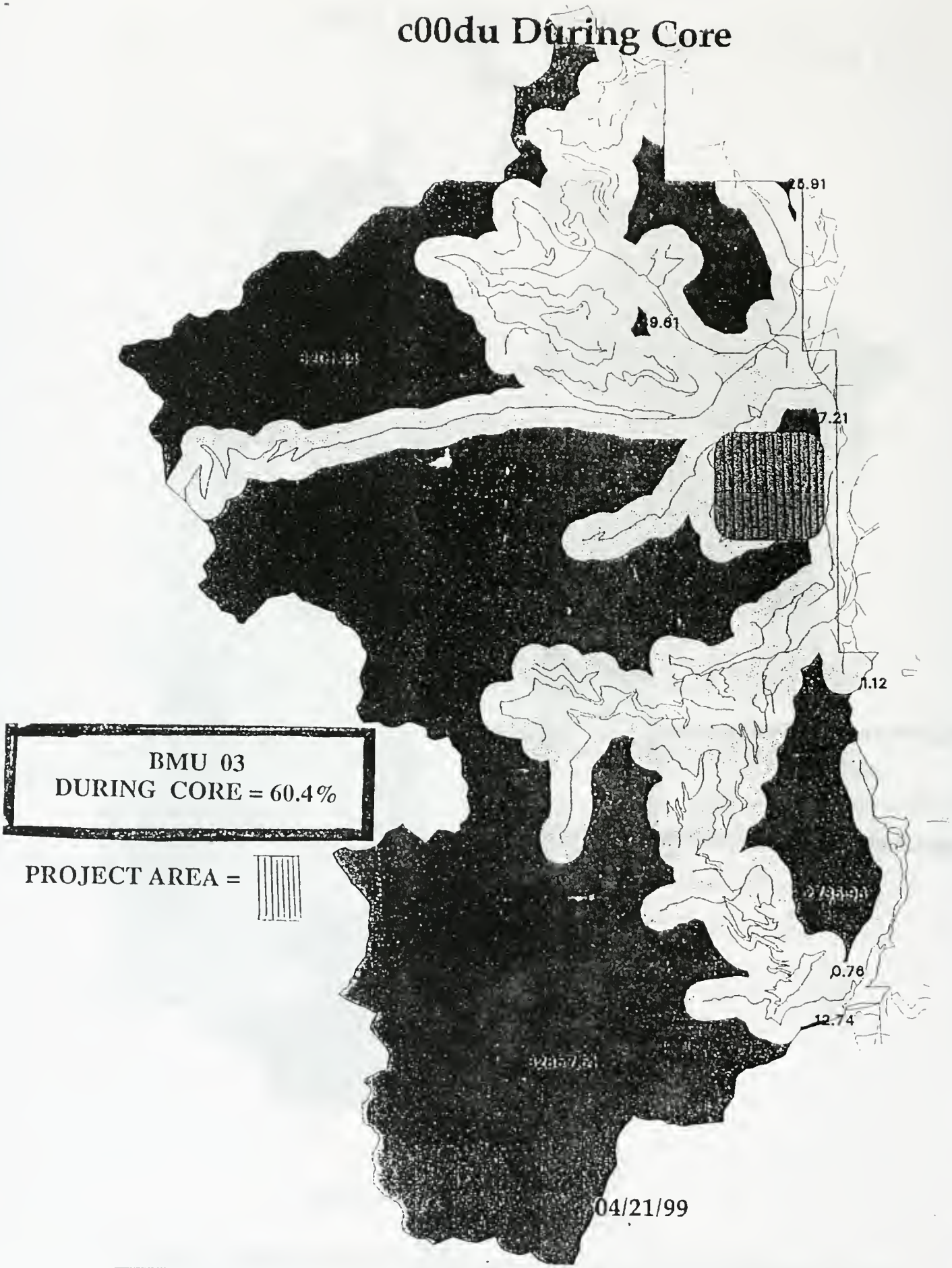
PROJECT AREA =

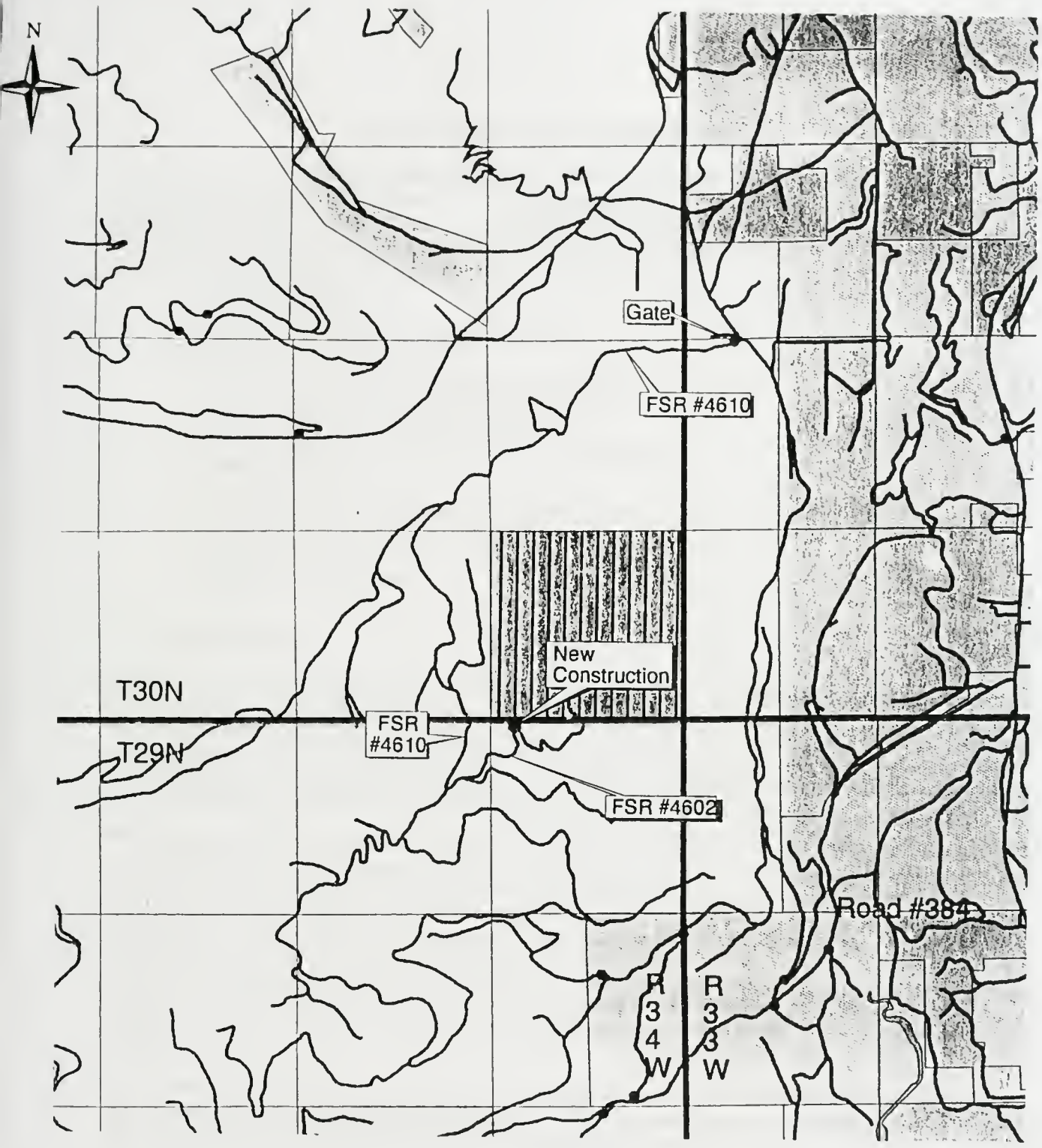
11/03/98

c00ex Existing Core



c00du During Core





Legend:

- Gate
- Roads
- FS
- State
- Private

KEELER FRTA Vicinity Map

FISHERIES BIOLOGICAL ASSESSMENT

KOOTENAI NATIONAL FOREST, REGION 1, MONTANA

Project Name: Keeler Road Use Permit **Preparer:** Norm Merz, Wildlife Biologist, DNRC
Ranger District: Three Rivers **Date Prepared:** 1 December 1998

The following Biological Assessment (BA) is designed to satisfy the requirements of the Forest Service and U.S. Fish and Wildlife Service (FWS). This BA consists of 15 parts:

1. Project Description
2. Watershed Description
3. Species Descriptions and Habitat Requirements
4. Forest Plan Standards
5. Environmental Baseline - Species Indicators and Habitat Indicators
6. Status of INFISH Riparian Management Objectives
7. Direct, Indirect, and Cumulative Effects
8. Potential Effects to Species Indicators and Habitat Indicators
9. Matrix Checklist
10. Compliance with INFISH
11. Determination - Dichotomous Key for making ESA Determinations of Effects
12. Documentation of Expected Incidental Take
13. References Cited
14. Summary and Signature
15. Maps

1. Project Description

The State of Montana Department of Natural Resources and Conservation (MDNRC) requested a road use permit from the Forest Service to haul logs from Section 36, T30N, R34W (State Trust Land). The proposed project area is located approximately 11 miles south of Troy, MT on Kootenai National Forest (see Figure 1). The proposal calls for harvesting between 2 and 6 Million Board Feet of timber from this section. The project would access the state section via the South Fork Keeler end of FSR #4610 to FSR #4602. Approximately ≈00 feet of new construction would be required on National Forest land to gain access to the state section (Figure 2).

The Alternatives differ by the amount of timber harvested and road constructed. Under Alternative 2, timber would be harvested from 114 acres using regeneration techniques and 1.0 miles of new road would be constructed (Figure 3). Under Alternative 3, the 114 acres described above would be harvest as stated. In addition, 10 acres of blowdown would be salvaged using cable harvest and 318 acres would be helicopter harvested on the east side of Keeler Mountain. This 318-acre unit would apply a group selection to create small patch clear cuts ranging in size from ¼ to 5 acres. The volume harvested would be from 50% of the area. To access the units, 1.4 miles of road would be constructed under this alternative (Figure 4). Alternative 4 would harvest the same volume over the same acreage as Alternative 3 but would build a total of 2.2 miles of road. This additional road would facilitate the treatment of some of the area by cable harvest and soft track skidding systems instead of the more costly helicopter methods.

Alternative 4 contains the most road building and timber harvesting of all the action alternatives, therefor this alternative will be analyzed in detail (Figure 4). If the effects of this alternative were deemed acceptable, then any other alternative that would be chosen would also be acceptable.

Under Alternative 4, (Figure 5) harvest would occur on approximately 442 acres. Approximately, 338 acres in 1 harvest unit on the eastern aspect of Keller Mountain would be harvested using a group selection over 50% of the area. This would be logged by using a combination of skyline and helicopter methods, creating small openings ranging from ¼ to 5 acres in size. Areas 500 to 800 feet below the road would be harvested using cable methods and some areas above the road would be tractor logged Following harvest, a spring under-burn would be conducted to control fuel buildup and closer align these stands to historic conditions. On the remaining 114 acres, regeneration harvests would occur in 3 harvest units. After harvest, the regeneration units would be grapple piled in areas above the road and broadcast burned below the roads. On the northside of the

mountain a spring evolves near the elevation of the road location. This spring does gather other surface flow and contributes to Keeler Creek. On the north side of the section, a 10-acre unit would receive a salvage harvest. No harvesting would occur in the SMZs in any of the proposed treatments.

The direct action would consist of constructing new roads and bringing the existing roads up to BMP standards. Approximately 300' of road would be constructed on federal land. On State land, approximately 2.2 miles of road would be constructed near the top of the ridge. This road would be built to BMP standards. The majority of the road would be constructed on stable soils. On the north side of the mountain the road location crosses a wet seep where there are wet and unstable soils for 100-200 feet. In this area, mesh and gravel would be installed to minimize soil erosion from the road prism. These roads would be used to harvest and haul timber from the State section.

Road #4610 would need to be brought up to BMP standards, and Road #4602 would need some minor reconstruction (see Figure 6 for road improvements). Proposed repair activities include installation of adequate surface drain-age and ditch relief structures over the entire 4.3 miles of existing Forest Service road, stabili-zation of an existing cutslope which is unstable and slumps annually, and re-routing surface and ditch runoff where they are routed directly to streams and draws. These activities will lead to short term increases in sediment during the period of operation, particularly in and around the existing draw and stream crossings, but will lead to a long-term decrease in sedi-ment by eliminating chronic sources of sediment.

To compensate for the construction of roads on federal and state land, the Kootenai National Forest agreed to close and rehabilitate an equal distance of roads. FSR #14334 and several associated spur roads are proposed for obliteration. These roads are in T30N R34W Section 35 and T29N R34W Sections 3 and 4 (see Figure 7). The closure and rehabilitation would consist of recontouring approximately 300' starting from where the road departs from the open route, removing and recontouring stream crossing culverts, installing several dozen surface drainage features along the obliterated road system, and seeding all disturbed areas with site adapted ground cover plants to stabilize the soil

Currently, MDNRC plans to sell the timber sale in the year 2000. Harvest would occur within 4 years (by 2004). During this time period, this road would be open. Following logging, the road would be gated, however, post sale work would be conducted behind the closed gate for approximately 3 years. Table 1 Summarizes the project actions.

TABLE 1 ALTERNATIVE 4 PROJECT SUMMARY

Timber Harvest Treatments	Acres
Regeneration Harvests (seedtree harvests and clearcut with reserves)	114
Group Selection Harvests	318
Salvage Harvest	10
Total Harvest Acres	442
Harvest Unit Fuel Treatments	Acres
Grapple Pile/Burn Piles	64

Underburn	50
Spring jackpot burn/Fuels reduction	159
Total Burning	273
Roads	Miles or Feet
New Road Construction on State Lands	2.2 miles
New Road Construction on USFS Lands	200 feet
Watershed Improvements	
Road Obliteration	2.2 miles
Road Improvements (BMPs)	4.3 miles

2. Watershed Description

The Project Area encompasses the top portion of Keeler Mountain. The west side of Keeler Mountain is within the South Fork Keeler watershed and the east side of the mountain is within Lake watershed. Lake Creek is a fifth-order stream with a 130,500 acre watershed. Most of the upland portion of the watershed is National Forest while the valley bottoms are under private ownership. South Fork Keeler watershed is 4245 acres in size which forms a third-order stream tributary to Keeler Creek. The Spruce Lakes form the headwaters of South Fork Keeler Creek. The entire Keeler Creek watershed is approximately 32,800 acres in size and forms a fourth-order tributary to Lake Creek. Lake Creek flows north and is tributary to the Kootenai River. The confluence is in the town of Troy. Precipitation in and around the project area ranges from 40 inches annually at Lake Creek to 90+ inches in the higher elevations. At the higher elevations, most of the precipitation falls as snow. The Keeler watershed is strongly influenced by rain on snow events.

The east flank of Keeler Mountain, which is within the Lake watershed, is drained by several first-order drainage's. These drainage's consist of a series of scoured bedrock draws on 60+% gradient which flow during spring snow melt periods. These draws have defined channels in the steep portions on State land, but all evidence of a channel disappears by the time they reach the Spar Lake road, which lies approximately 200 feet from lake Creek.

On the west side of Keeler Mountain, first order watershed B (see Figure 8) consists of a series of seven ephemeral draws that originate on the State section. Within the section these draws do not show any evidence of scouring. After leaving the section these draws combine into one steep gradient scoured channel. This channel enters a flat and evidence of a scoured channel disappears before entering South Fork Keeler Creek.

3. Species Descriptions and Habitat Requirements

The following discussion of bull trout habitat requirements in Montana is taken from MBTSG 1998. The majority of migratory bull trout spawning in Montana occurs in a small percentage of the total stream habitat available. Spawning takes place between late August and early November, principally in third and fourth order streams. Spawning adults use low gradient areas (< 2%) of gravel/cobble substrate with water depths between 0.1 and 0.6 m and velocities from 0.1 to 0.6 m/s. Proximity of cover for the adult fish before and during spawning is an important habitat component. Spawning tends to be concentrated in reaches influenced by groundwater where temperature and flow conditions may be more stable. The relationship between groundwater exchange and migratory bull trout spawning requires more investigation. Spawning habitat requirements of resident bull trout are poorly documented. Successful incubation of bull trout embryos requires water temperatures below 8°C, less than 35-40% of sediments smaller than 6.35 mm in diameter, and high gravel permeability. Eggs are deposited as deep as 25.0 cm below the streambed surface and the incubation period varies depending on water temperature. Spawning adults alter streambed characteristics during redd construction to improve survival of embryos, but conditions in redds often degrade during the incubation period. Mortality of eggs or fry can be caused by scouring during high flows, freezing during low flows, superimposition of redds, or deposition of fine sediments or organic materials. A significant inverse relationship exists between the percentage of fine sediment in the incubation environment and bull trout

survival to emergence. Entombment appeared to be the largest mortality factor in incubation studies in the Flathead drainage. Groundwater influence plays a large role in embryo development and survival by mitigating mortality factors.
Rearing habitat requirements for juvenile bull trout include cold summer water temperatures (15°C) provided by sufficient surface and groundwater flows. Warmer temperatures are associated with lower bull trout densities and can increase the risk of invasion by other species that could displace, compete with, or prey on juvenile bull trout. Juvenile bull trout are generally benthic foragers, rarely stray from cover, and they prefer complex forms of cover. High sediment levels and embeddedness can result in decreased rearing densities. Unembedded cobble/rubble substrate is preferred for cover and feeding and also provides invertebrate production. Highly variable stream flow, reduction in large woody debris, bedload movement, and other forms of channel instability can limit the distribution and abundance of juvenile bull trout. Habitat characteristics that are important for juvenile bull trout of migratory populations are also important for stream resident subadults and adults. However, stream resident adults are more strongly associated with deep pool habitats than are migratory juveniles.
In Montana, bull trout may have either a resident or migratory life history. Resident fish usually spend their entire lives in headwater streams. Both migratory and stream-resident bull trout move in response to developmental and seasonal habitat requirements. Migratory individuals can move great distances (up to 156 miles) among lakes, rivers, and tributary streams in response to spawning, rearing, and adult habitat needs (Swanberg 1996). Stream-resident bull trout migrate within tributary stream networks for spawning purposes, as well as in response to changes in seasonal habitat requirements and conditions. Open migratory corridors, both within and among tributary streams, larger rivers, and lake systems are critical for maintaining bull trout populations.

Rieman and McIntyre (1993) determined that stream channel stability, habitat complexity, substrate composition, temperature and migration corridors are the most important factors influencing survival of bull trout.

Both migratory and stream-resident bull trout move in response to developmental and seasonal habitat requirements. Migratory individuals can move great distances (up to 250 km) among lakes, rivers, and tributary streams in response to spawning, rearing, and adult habitat needs. Stream-resident bull trout migrate within tributary stream networks for spawning purposes, as well as in response to changes in seasonal habitat requirements and conditions. Open migratory corridors, both within and among tributary streams, larger rivers, and lake systems are critical for maintaining bull trout populations.

Field crews for the Montana Fish, Wildlife and Parks (MFWP) conducted redd surveys for Keeler Creek from the South Fork to the confluence with Lake Creek for the years 1996, 1997 and 1998. The results for those years are 74, 59 and 92 respectively. Anecdotal information suggests that historically adult bull trout were illegally harvested in Keeler Creek.

Montana Fish, Wildlife and Parks (MFWP) have designated bull trout as a species of special concern due to their limited distribution, sensitivity to environmental disturbances, vulnerability to hybridization and/or competition with other fish species, and risk of over exploitation. The State will take appropriate measures to preserve and enhance populations of these fish through their stocking programs, fishing regulations and habitat protection efforts.

4. Forest Plan Standards
The Kootenai Forest Plan was amended on August 30, 1995 by the Inland Native Fish Strategy (INFISH) (USDA Forest Service 1995). This interim strategy was designed to provide additional protection for existing populations of native trout, outside the range of anadromous fish, on 22 National Forests in the Pacific Northwest, Northern and Intermountain Regions. Implementing this strategy was deemed necessary as these species were at risk due to habitat degradation, introduction of exotic species, loss of migratory forms and over-fishing. As part of this strategy, the Regional Foresters designated a network of priority watersheds. Priority watersheds are drainages, which still contain excellent habitat or assemblages of native fish, provide for metapopulation objectives, or are watersheds, which have excellent potential for restoration. The priority watersheds on the Kootenai National Forest include Rock Creek, Vermilion River, Bull River, lower Yaak River, Wigwam River, West Fisher River, Phillips/Sophie Creeks, Pipe Creek, Libby Creek, Lake Creek, Silver Butte Creek, Quartz Creek, O'Brien Creek, Grave Creek and Callahan Creek.
INFISH also established Riparian Management Objectives (RMOs) and Riparian Habitat Conservation Areas (RHCA). RMOs are habitat parameters that describe good fish habitat. Where site-specific data is available, these

RMOs can be adjusted to better describe local stream conditions. These RMOs for stream channel conditions provide the criteria against which attainment or progress toward attainment of riparian goals is measured. RHCAs are portions of watersheds where riparian dependent resources receive primary emphasis. The RHCAs are defined for four categories of stream or waterbody dependent on flow conditions and presence of fish. The RHCAs are areas within specific management activities are subject to standards and guidelines in INFISH in addition to existing standards and guidelines in the Kootenai Forest Plan.

5. Environmental Baseline - Species Indicators and Habitat Indicators

Lake Creek, the outlet of Bull Lake, flows for approximately 18 miles before draining into the Kootenai River. A dam (constructed in 1910) in Lake Creek about a mile up from the Kootenai River isolates bull trout in Bull Lake, Lake Creek and its tributaries from those inhabiting the Kootenai River. Although it has not been verified, it appears that prior to the construction of the dam, the upstream movement of bull trout was limited because of the physical characteristics of the lower section of Lake Creek. A steep canyon section near the present day dam may have prohibited upstream movement of bull trout in the Kootenai River to Lake Creek. A disjunct population of bull trout exists today in Bull Lake. These fish are thought to spawn primarily in Keeler Creek, a tributary to Lake Creek, although other tributaries to Lake Creek provide spawning habitat for bull trout. Brook trout are known to inhabit Bull Lake, Lake Creek and Keeler Creek, threatening the future persistence of this disjunct population of bull trout.

The following descriptions correspond to the 19 habitat and 4 species indicators listed on the USFWS bull trout matrix (USFWS, 1998). For the purpose of consistency with the USFWS bull trout matrix, each indicator was rated as functioning appropriately (FA), functioning at risk (FAR), or functioning at unacceptable risk (FUR). Those indicators evaluated for just the portions of the watershed which are thought to provide bull trout habitat are denoted with an asterisk.

Species Indicators: DISJUNCT BULL LAKE POPULATION

The following species indicators refer to the entire disjunct Bull Lake population. The Bull Lake population is thought to spawn primarily in Keeler Creek, a tributary to Lake Creek. Other tributaries to Lake Creek provide spawning habitat for bull trout. However, spawning has not been confirmed anywhere except within Keeler Creek. This includes the North Fork, South Fork, and main Keeler Creek. Spawning in South Fork Keeler Creek is limited to the lowest mile of stream. This lowest portion of South Fork Keeler Creek drains a wetland which is strongly influenced by subsurface flow. Above the wetland, the stream channel is intermittent in nature with surface flow only during runoff events. Temperature data verifies the water supply is spring dominated because water temperatures remain cold throughout the summer

1) *Subpopulation Size:* (FAR)

There were 74, 59 and 92 redds counted in Keeler Creek in 1996, 1997, and 1998, respectively (Mike Hensler, Montana Fish, Wildlife and Parks, personal communication). The Ministry of the Environment in British Columbia estimated an adult:redd ratio of 2.1:1, 1.2:1, and 1.5:1 in a section of the Wigwam River, British Columbia in 1996, 1997 and 1998, respectively (Bill Westover, British Columbia Ministry of the Environment, personal communication). Using the 2.1:1 ratio, the largest estimated number of bull trout using Keeler Creek were 155, 124 and 193 in 1996, 1997, and 1998, respectively. Although bull trout may use other unidentified areas in the Lake Creek drainage, most are thought to spawn in Keeler Creek. In addition, bull trout do not necessarily spawn every year (Rieman and McIntyre 1993), but this is the only population data available to estimate the size of this disjunct population.

2) *Growth & Survival:* (FAR)

There is insufficient data to determine growth and survival of the disjunct Bull Lake population.

3) *Life History Diversity & Isolation:* (FUR)

The Bull Lake population has an adfluvial, migratory life history form. The population appears to be primarily dependent on spawning in Keeler Creek. It is not known if there is a resident life history form of bull trout within this disjunct population.

4) *Persistence and Genetic Integrity:* **(FUR)**

The Bull Lake population is disjunct, and the only known spawning tributary is Keeler Creek. Brook trout occur throughout the Lake Creek and Keeler Creek drainage and threaten the persistence and genetic integrity of bull trout. The probability of hybridization or displacement by competition is imminent and several documented cases are known to have occurred. This population is at high risk of extirpation.

Existing Habitat Indicators:

*1) Temperature: **

South Fork Keeler: (FA) According to 1998 data, the water temperature did not exceed 12°C throughout the summer. Although only one year of data is available, it appears this a key habitat parameter making this watershed a core spawning area for the disjunct bull trout population.

*2) Sediment: **

South Fork Keeler: (FAR) According to ocular estimates using a 49-intersection grid made during a habitat survey conducted in 1998, surface fines were approximately 7%. This data was only collected in the tail-out of scour pools. It is assumed that cumulative effects from peak flow events is somewhat muted as a result of the wetland area above the lowest portion of South Fork Keeler Creek. Furthermore, it appears this lowest portion of the stream channel is fairly stable.

*3) Chemical Contamination /Nutrients: **

South Fork Keeler: (FAR) Keeler Creek is listed as a Water Quality Limited Segment mainly as a result of past harvest and extreme runoff events in the upper portions of main Keeler Creek. There are no known historic mines located in South Fork Keeler Creek.

*4) Physical Barriers: **

South Fork Keeler: (FA) Within the South Fork Keeler Creek, no man made barriers which affect bull trout are known to occur.

*5) Substrate Embeddedness: **

South Fork Keeler: (FAR) Substrate embeddedness in rearing areas has not been quantified.

*6) Large Woody Debris: **

South Fork Keeler: (FAR) According to habitat surveys in 1998, large woody debris numbers appear to be adequate. Riparian harvest has occurred over fifty years ago. It does not appear that there has been much riparian harvest in the lowest portion of the South Fork since the 1940's.

*7) Pool Frequency and Quality: **

South Fork Keeler: (FA) According to habitat surveys in 1998, there are approximately 50 pools/mile in the lowest section of South Fork Keeler.

*8) Large Pools: **

South Fork Keeler: (FAR) According to habitat data, there are approximately 3.5 large pools/mile.

*9) Off-Channel Habitat: **

South Fork Keeler: (FAR) As a result of minimal riparian disturbance in the past fifty years, off-channel habitat is another key habitat parameter for bull trout making the South Fork Keeler very important to bull trout in this disjunct bull trout population.

*10) Refugia: **

South Fork Keeler: (FUR) For the entire Keeler watershed, the RHCAs are not connected and prime habitat is spotty. The lowest portion of the South Fork Keeler would definitely be considered prime habitat as a result of the deep pools, groundwater influence, off-channel habitats, and winter rearing. However, prime habitat is not connected throughout the entire Keeler watershed.

*11) Average Wetted Width/Maximum Depth Ratio: **

South Fork Keeler: (FA) According to 1998 fish habitat surveys, the average wetted width/max depth ratio is 9.7. This only includes the lowest portion of South Fork Keeler known to provide bull trout habitat.

*12) Streambank Condition: **

South Fork Keeler: (FAR) The portion accessible to bull trout is forested. However, according to fish habitat surveys in 1998, greater than 80% of the banks were considered stable.

*13) Floodplain Connectivity: **

South Fork Keeler: (FAR) Based on the limited riparian disturbance in the past fifty years and the amount of side-channel habitat and vegetative types, floodplain connectivity is considered to be evolving. Portions of the stream channel have somewhat disconnected habitats while other areas are connected.

14) Changes in Peak/Base Flows:

South Fork Keeler: (FAR) According to WATSED, current peak flow increases are within Forest Plan Standards. Change in peak flows are not significant in South Fork Keeler compared to the rest of the Keeler watershed. The South Fork Keeler watershed is unique in that over 65% of the total area for the watershed is included in the Spruce Lakes basin. This area contributes to South Fork Keeler in the form of subsurface springs. Although past management may have affected peak flows, the degree of impact is not fully understood due to the Spruce Lakes area. It is unknown how past management has affected base flows. The majority of historic harvest in the South Fork Keeler watershed has occurred in the Spruce Lakes area. Harvest has occurred in lower South Fork Keeler in the past fifteen years.

15) Increase in Drainage Network:

South Fork Keeler: (FAR) There are areas of roads and skid trails that intercept subsurface flow during spring runoff events. These areas are widespread throughout the lower portion of the watershed causing an extension of channel network.

16) Road Density and Location:

South Fork Keeler: (FAR) The road density is considered moderate for the entire watershed.

17) Disturbance History:

South Fork Keeler: (FAR) ECA for the South Fork Keeler watershed is less than 15%. Disturbance is concentrated and partially located in potentially unstable and or riparian areas.

18) Riparian Conservation Areas:

South Fork Keeler: (FUR) The riparian area throughout the South Fork Keeler watershed is fragmented and poorly connected. There has been a loss of function in certain areas. However, loss of function in the lowest portion of the watershed providing bull trout habitat has been limited and cumulative effects of the watershed have been somewhat muted due to the function of the wetland upstream of bull trout habitat.

19) Disturbance Regime:

South Fork Keeler: (FAR) The severity of processes in South Fork Keeler has been increased with disturbances localized to a minor fraction of the watershed.

20) Integration of Species and Habitat Conditions:

It is impossible to integrate the species and habitat conditions for the South Fork Keeler watershed without cumulatively assessing the entire Keeler watershed and importance of this watershed to the existence of this disjunct population of bull trout. As mentioned previously, the Keeler watershed is the only area

within the Lake Creek watershed that is documented as providing spawning habitat for bull trout from Bull Lake. Known spawning areas exist in the lowest portion of South Fork Keeler Creek, North Fork Keeler Creek and the lowest portion of main Keeler below the confluence of the North Fork. It appears that groundwater influence may be the most important habitat parameter for these spawning areas.
The Keeler Creek drainage has been extensively cut over in the last fifty years. Most of the harvest occurred in the 3500-5000 feet elevation zone which is highly susceptible to rain on snow events. In 1984, the Forest Service published the "Keeler Management Plan". This document was the product of an interdisciplinary team that identified management options for the watershed which experienced recurrent flooding and costly damage in the 1970's and 1980's. Cumulative effects to the Keeler watershed include degraded upland conditions and riparian and stream channel disturbance. Timber harvest and road construction in the upper portion of the watershed have resulted in elevated peak flows and increased sediment delivery to the stream channel. Riparian harvest and removal of acting large woody debris from the stream channel has adversely affected channel stability throughout the mainstem of Keeler Creek. The current fish habitat condition for the entire Keeler watershed has not been recently quantified, except for the lowest portion of South Fork Keeler.

South Fork Keeler: (FUR) The quality of the bull trout habitat throughout the watershed has been compromised from past human disturbance. While habitat has been compromised, according to fish habitat data, overall habitat condition appears to be adequate. Data is insufficient to determine trends in population size. Connectivity of this population is limited because it is disjunct and the population appears to be dependent on Keeler Creek. Several known cases of hybridization with brook trout and several cases of poaching of adult spawners have also been documented. The population is at high risk of extirpation, mainly as a result of the imminent risk of hybridization with brook trout.

6. Status of INFISH Riparian Management Objectives for South Fork Keeler Creek

Habitat Feature	Interim INFISH RMO	Existing Condition
Pool Frequency		Meets
Water Temperature	< 15°C adult habitat, < 9°C	Meets
Large Woody Debris (Forested)	> 20 pieces per mile	Meets
Bank Stability (non-forested)	> 80 percent stable	N/A
Lower Bank Angle (non-forested)	> 75 percent of banks < 90? angle	N/A
Width/Depth Ratio	< 10	Meets - for scour pools

7. Direct, Indirect, and Cumulative Effects

Direct and Indirect Effects: There is a very low probability this project would cause any detectable or measurable sediment input to streams. Rationale is given in the effects to habitat indicators section.
Road work related to the timber sale activities includes road construction to access harvest units, haul road reconstruction including reconditioning, surfacing, installation of stream culverts and cross drains, and cleaning of ditches and catchbasins, haul road maintenance including blading and dust control, and erosion control work on roads being closed for protection of grizzly bear habitat.

The new road construction will cross one wet seep area on the north side of Keeler Mountain. French drains and on rock gabions will be installed to stabilize to road prism at this crossing. Numerous road grades were attempted to avoid this seep, but due to a critical road location control point located at a saddle in the northeast corner of the section this seep could not be avoided.

Slash treatment methods including underburning, jackpot burning and broadcast burning would not have measurable effects on water quality, since no harvest and no slash burning would occur in the RHCAs.

Erosion and resulting stream sedimentation from harvest activities is a low concern. Harvest systems on moderate slopes (>35% will use a combination of cable methods and a soft track ground based systems. Helicopter yarding method will be incorporated on the moderate to steep slopes where the previously described yarding methods are impractical because of yarding distances and restrictions due to terrain. Potential destabilization of slopes resulting in possible sediment delivery was considered using landtype maps, and field investigation. The implementation of RCHAs will be incorporated in all harvest plans.

Cumulative Effects: Each of the action alternatives would permanently close and rehabilitate an equal amount of road that would be constructed in the South Fork of Keeler Creek watershed. Portions of the road would be recontoured in the natural angle and armored, surface drainage and erosion control features would be installed and the entire system would be seeded with site adapted plants to stabilize the soil. The proposed watershed rehabilitation work would reduce the impact of the existing and proposed road system on the natural hydraulic processes in the project area.

The South Fork of Keeler Creek is a 3533-acre watershed which currently has a 4.1% watershed yield increase. The proposed actions will have negligible impact on stream condition. Anticipated increase in watershed yield will be < 1%.

This project has a very low probability of contributing minor (undetectable and unmeasureable) amounts of sediment to bull trout habitat. Any sediment input from this project would contribute to the cumulative sedimentation of bull trout to a very minor degree, but the effect would be so small that it could not be detected or measured. No loses or take of bull trout individuals are expected to occur as a result of sediment input. There would be no cumulative effects on water yields or water temperatures from this project.

South Fork Keeler

Diagnostic/Pathways: Indicators	Population and Environmental Baseline	Major Effects of the Action(s)	Minor Effects of the Action(s)	Comments
INFISH Compliance: Meets	**FA; FAR; FUR**	**Restore, Maintain, Degrade**	**Restore, Maintain, Degrade**	**Long term effects**
Subpopulation Characteristics:[1]				
Subpopulation Size	FAR	Maintain	Maintain	
Growth & Survival	FAR	Maintain	Maintain	
Life History Diversity & Isolation	FAR	Maintain	Maintain	
Persistence and Genetic Integrity	FAR	Maintain	Maintain	
Water Quality:[1]				
Temperature	FAR	Maintain	Maintain	
Sediment	FUR	Maintain	Degrade	Restore
Chemical Contamination / Nutrients	FAR	Maintain	Degrade	Restore
Habitat Access:[1]				
Physical Barriers	FAR	Maintain	Maintain	
Habitat Elements:[1]				
Substrate Embeddedness	FUR	Maintain	Degrade	Restore
Large Woody Debris	FUR	Maintain	Maintain	
Pool Frequency & Quality	FUR	Maintain	Maintain	
Large Pools	FUR	Maintain	Maintain	
Off-Channel Habitat	FUR	Maintain	Maintain	
Refugia	FUR	Maintain	Maintain	
Channel Condition & Dynamics:[1]				
Wetted Width/Max Depth Ratio	FUR	Maintain	Maintain	
Streambank Condition	FUR	Maintain	Maintain	
Floodplain Connectivity	FUR	Maintain	Maintain	
Flow & Hydrology:[2]				
Change in Peak/Base Flows	FUR	Maintain	Degrade	Restore
Drainage network Increase	FUR	Maintain	Restore	
Watershed Conditions:[2]				
Road Density & Location	FUR	Maintain	Maintain	
Disturbance History	FUR	Maintain	Degrade	Restore
Riparian Conservation Area	FUR	Maintain	Degrade	
Disturbance Regime	FUR	Maintain	Degrade	Restore
Integration of Species & Habitat Condition	FUR	Maintain	Degrade	Restore

[1] These indicators are evaluated for portions of the watershed which are thought to provide bull trout habitat.
[2] These indicators are evaluated for the entire watershed for cumulative effects.

Potential Effects to Species Indicators and Habitat Indicators

Species Indicators:

1) *Subpopulation Size:* (Maintain) The proposed actions is not expected to impact water temperature, runoff or sediment delivery. Also, the proposed actions will not create any barriers for migration or create any new access points for poaching.

2) *Growth & Survival:* (Maintain) Same as above.

3) *Life History Diversity & Isolation:* (Maintain) Same as above.

4) *Persistence and Genetic Integrity:* (Maintain) Same as above.

Habitat Indicators:

1) *Temperature:* (Maintain) No data is available. The proposed action is not expected to impact water temperature because no timber harvests are planned in the RCHA or near South Fork of Keeler or Lake Creek.

2) *Sediment:* (Degrade-Short Term/Restore-Long Term) Road reclamation would occur equally to compensate for road construction in the South Fork Keeler Creek watershed. Portions of the road would be recontoured to the natural slope, culverts would be removed and the streams would be laid back to a stable angle and armored, surface drainage and erosion control features would be installed, and the entire system would be seeded with site adapted plants to stabilize bare soil. These rehabilitation measures would lead to short term input of sediment to the creeks during the process of culvert removal, and bare ground would be exposed until grass seeding took effect, but these proposed road rehabilitation's would lead to a long term decrease in sediment production and delivery to the South Fork of Keeler Creek.

The primary impact to water quality from any action alternative is the repair of the current road system. Proposed repair activities include installation of adequate surface drain-age and ditch relief structures over the entire 4.3 miles of existing Forest Service road, stabili-zation of an existing cutslope which is unstable and slumps annually, and re-routing surface and ditch runoff where they are routed directly to streams and draws. These activities will lead to short term increases in sediment during the period of operation, particularly in and around the existing draw and stream crossings, but will lead to a long-term decrease in sedi-ment by eliminating chronic sources of sediment. The proposed new road would cross a series of seven draws, which have no defined channel or banks. All appropriate mitigation measures and BMP's would be applied to all draw crossings and road construction.

Logging systems in the proposed regeneration harvest units would use cable yarding below the road, and low pres-sure soft-track skidders above the road. Each of these logging systems have low impact to ground disturbance, and none of the proposed harvest is located in or near a stream or draw. The limited nature of the harvest in the north watershed presents a low risk of impacts to water quality, and none of the proposed harvest would take place in or near a draw or stream. The helicopter yarding would have minimal impacts to water quality on the east face of Keeler Mountain, and harvest would not occur in draw bottoms but be focused on ridges. The logging system for the remaining 318 acres of harvest in this Alternative would be yarded using a combination of low-pressure soft-track skidders above the road, cable yarding below the road for several hundred feet, and a helicopter for the remainder.

3) *Chemical Contamination/Nutrients:* (Degrade-Short Term/Restore-Long Term) Typically, there is a 3 to 4 year increase in the nitrogen and phosphorus in streams draining a newly harvested area. This brief increase in the two nutrients critical to stream productivity results from the breakdown of logging slash, the flushing of some soil nutrients normally taken up by trees, and in some cases due to slash burning. These short term indirect and cumulative water quality effects do not generally extend very far downstream due to mitigation by instream sediments and uptake by plants and animals (Murphy and Meehan 1991). Due to the implemented buffer widths there will be a immeasurable effect due to nutrient introductions to bull trout habitat.

4) *Physical Barriers:* (Maintain) The proposed action will not install or create any physical barriers to bull trout movements.

5) *Substrate Embeddedness:* (Maintain) If the proposed action is implemented, substrate embeddedness is expected to improve in time. The repair of chronic sedimentation sources would reduce sediment loading. In time, the fine sediments occurring in South Fork of Keeler Creek would be washed down stream and with decreased sedimentation would not be replaced.

6) *Large Woody Debris:* (Maintain) The proposed action would not effect large woody debris because no harvests are planned in the SMZ near Keeler or Lake Creek.

7) *Pool Frequency & Quality:* (Maintain) The proposed action will not impact the pool frequency or quality.

8) *Large Pools:* (Maintain) The proposed action will not impact the large pools.
9) *Off-Channel Habitat:* (Maintain) The proposed action will not impact this parameter.
10) *Refugia:* (Maintain) The proposed action will not impact this parameter.
11) *Wetted Width/Max Depth Ratio:* (Maintain) The proposed action will not impact this parameter, since the proposed activities are not thought to cause channel degradation.
12) *Streambank Condition:* (Maintain) The increase in peak flows in the South Fork Keeler Creek is considered to be minimal thus, the proposed activities will not affect channel morphology.
13) *Floodplain Connectivity:* (Maintain) Since expected peak flow increases is not thought to cause channel degradation, the proposed activities will not affect flood plain connectivity.
14) *Change in Peak/Base Flows:* (Degrade-Short Term) The South Fork of Keeler Creek is a 3533 acre watershed which currently has a 4.1% watershed yield increase. The maximum effect on ECA from the proposed actions would be and ECA increase of <1% ECA. The proposed action would not increase peak flows to a point likely to change the current channel condition. There would simultaneously be a decrease resulting from vegetative recovery on previously harvested acres.

15) Drainage Network Increase: (Maintain) Road reclamation would occur equally to compensate for road construction in the South Fork Keeler Creek watershed. Alternative 4 would construct 2.2 miles of new road and harvest timber form 454 acres. An equal amount of road system would be closed and rehabilitated. Portions of these roads would be recontoured to the natural slope, culverts would be removed and the stream banks would be laid back to a stable angle and armored. Surface drainage and erosion control features would be installed. Rehabilitated areas would be seeded with site adapted plants to stabilize bare soil.
16) *Road Density & Location:* (Maintain) The road densities for all watersheds will maintain this parameter. Under any action alternative any increase in road construction will be accompanied by an equal amount of road closures and stream crossing rehabilitation.
17) *Disturbance History:* (Degrade-Short Term) Please see the discussion under 14) Changes in Peak/Base Flows.
18) *Riparian Conservation Area:* (Degrade-Short Term) The road location crosses a wet seep which is located at the headwaters of watershed D. French drains will be installed to help drain this seep and rock gabions will be used to stablize the road. Several attempts were made to avoid this seep, but due to a critical road location control point, this seep could not be avoided.
19) *Integration of Habitat and Species Conditions:* (Maintain) Although baseline data is lacking, the proposed activities are not expected to measurably degrade bull trout habitat. Cumulatively, watershed recovery will be retarded, however, it is not thought to adversely affect bull trout or associated habitat.

Compliance with INFISH

The proposed project complies with the INFISH guidelines.

Determination - Dichotomous Key for making ESA Determinations of Effects

Dichotomous Key Decisions

1) Are there any proposed/listed fish species and/or proposed designated critical habitat in the watershed or downstream from the watershed?

No .....No Effect
YES .....go to 2

Bull trout spawn in Keeler Creek

2) Will the Proposed action(s) have any effect whatsoever on the species and/or critical habitat?

No .....No Effect
YES.....go to 3

3) Does the proposed action(s) have the potential to hinder attainment of relevant ''functioning appropriately' indicators?

NO .....**No go to 4**
Yes .....Likely to adversely affect

No indicators were classified in this category.

4) Does the proposed action(s) have the potential to result in "take" of any proposed/listed fish species or destruction/adverse modification of proposed/designated critical habitat?

There is a negligible (extremely low) probability of take to proposed/listed fish species or destruction/adverse modification of proposed /designated critical habitat.....Not Likely To Adversely Affect

There is more than a negligible probability of take of proposed/listed fish species or destruction/adverse modification of proposed /designated critical habitat.....Likely To Adversely Affect

The proposed project, together with related actions, reasonably foreseeable activities, and other projects spatially associated with the proposed project will result in an immeasurable direct, or indirect effect to bull trout or potential habitat.

Due to the low probability of any adverse affects reaching bull trout or their habitat, it is unlikely that the proposed activity will have any negative cumulative affect on bull trout.

Documentation of Expected Incidental Take

1) The proposed action may result in incidental take through which of the following mechanisms?

None: The project(s) has/have a negligible probability of take.

Harm: Significant impairment of behavioral patterns such as breeding, feeding, sheltering, and others (identify).

Harass: Significant disruption of normal behavior patterns which include, but are not limited to, breeding, feeding, sheltering, or others (identify).

Pursue, hunt, shoot, wound, capture, trap, collect.

2) What is the approximate duration of effects of the proposed action(s) resulting in incidental take?

3) Which of the following life stages will be subject to incidental take?

Fertilization to emergence (incubation)

Juvenile rearing to adulthood

Adult holding and overwintering

Adults spawning

Adults migrating

4) Which life form and subpopulation status are present in the watershed or downstream of the watershed where the activities will take place?

Life Form:Resident Subpopulation status: Strong

Fluvial Depressed

Adfluvial

5) What is the location of the expected incidental take due to the proposed action(s)?

Subbasin and watershed:

Stream reach and habitat units:

White Sturgeon

Description of Population and Habitat Status

Potential habitat for white sturgeon *(Acipenser transmontanus)* includes waters flowing through the Kootenai National Forest. The white sturgeon is restricted to 168 miles of the Kootenai River from Cora Linn Dam, Canada, upstream to Kootenai Falls, Montana. The Yaak River is considered to be potential habitat, but movement to the upper portion of the drainage is effectively blocked by the Yaak Falls. They migrate freely throughout the Kootenai River (Andrusak, 1980), but are uncommon upstream of Bonners Ferry, Idaho (Apperson and Anders, 1991, Graham, 1981). There are no published reports of sturgeon using lateral tributaries in Idaho or Montana (Partridge, 1983); however, accounts by local residents suggest that sturgeon may occur, if not actually rear, in lateral tributaries of the Kootenai River. Approximately 45 percent of the known potential habitat on the Kootenai National Forest is under joint State/Federal management. The remainder is managed by private and corporate landowners.

Approximately 880 white sturgeon comprise the Kootenai River stock. Apperson and Anders (1991) place a 95 percent confidence interval for the population at 638 to 1,211 fish. This equates to an average of 11 fish per mile of river below Bonners Ferry. Above Bonners Ferry (Graham 1981) estimated a total of only 1 to 5 individuals, however a census by the Montana Department of Fish, Wildlife and Parks (Skarr, 1992) resulted in the capture of only 1 individual. This analysis considers potential effect (direct, indirect, or cumulative) of the project on 3 or more white sturgeon individuals, including potential effects on their spawning habitat.

Sturgeon require boulder and cobble (3 to 5" diameter) bottoms and high water velocities (3 to 7 ft/sec) for spawning. These appear to be the two most critical spawning elements known to date. White sturgeon spawn during spring peakflows when velocities are high and turbidity is elevated. The fertilized eggs sink to the bottom, and then hatch within a few weeks. The newly hatched sac-fry briefly drift with the current before retreating into the substrate for up to a month. The juveniles eventually emerge from the bottom and begin a free-roaming life. Older white sturgeon are relatively sedentary in the deepest locations of the Kootenai River drainage, often selecting low velocity waters more than 20 feet deep. They are opportunistic feeders, and subsist on insects, clams, snails and fish. Kokanee from Kootenay Lake were once an important prey item prior to the collapse of the salmon fishery in the mid-1970's.

Operation of Libby Dam is considered the primary cause for decline of the white sturgeon (Holton, 1980, Apperson and Anders, 1991). Changes in the annual hydrograph (magnitude and timing of flows) have eliminated the spring (May to July) high flows required for successful reproduction, and produce large daily/weekly fluctuations in discharge that degrade habitat as well as increase mortality risk. Operation of the dam has also modified the annual thermal regime that sturgeon use (in part) as cues for spawning. Elimination of juvenile rearing habitat in Idaho due to agricultural diking and bank stabilization may also be adversely affecting juveniles because the sloughs and side channels were important rearing and foraging habitat for young sturgeon and their prey (Partridge, 1983).

Mining (copper) pollution and other chemical pollutants (lead, zinc, vermiculite, PCB's and organochlorides) are suspected to be potential threats to sturgeon reproduction (Apperson, 1992, Partridge, 1983). Some evidence of declining Kootenai River and Kootenay Lake productivity (Daley et.al., 1981) due to pollution abatement and dam operations has led to speculation that population recovery will be inhibited as a result. The degree of threat that water quality represents is unknown.

Non-point source pollution from forest management activities have not been identified as a factor in the decline of the Kootenai River white sturgeon stock. However, the direct and indirect effects of timber harvest and related actions can influence the magnitude and timing of peak streamflows (Harr, 1981). Forestry and related actions can also affect stream temperatures and nutrient and sediment loads (Brown and Krygier, 1970; Furniss et.al., 1991; Scrivener, 1982). Depending on the magnitude of cumulative actions and the proximity of activities to potentially affected habitat, a host of other physical characteristics of the environment may also be affected. Forestry and related activities rarely result in chemical pollution,

but could indirectly remobilize materials stored in stream substrate by altering peakflows. Unless ecological research on juvenile Kootenai River white sturgeon demonstrates a relationship between forestry and white sturgeon populations, the primary threats to the species are related to operation of the dam.

Analysis of Direct, Indirect and Cumulative Effects

Based on the nature of proposed activities and dilution, sediment production would be non measurable at the point of effect in the Kootenai River. Prio to the construction of Libby Dam, the Kootenai River peaked between 40,000 and 70,000 cubic feet per second (cfs). Currently, peak flows during spring runoff average between 9,0000 and 24,000 cfs. This combined with the sediment trap created by the dam has also significantly reduced the amount of sediment transported downstream.

The proposed project and related activities would also have insignificant indirect and cumulative effects on nutrient levels instream. Typically, there is a 3 to 4 year increase in nitrogen and phosphorus in streams draining a newly harvested area. This brief increase in the two nutrients critical to stream productivity results from the breakdown of logging slash, the flushing of some soil nutrients normally taken up by trees, and in some cases due to slash burning. These short term indirect and cumulative water quality effects do not generally extend very far downstream due to mitigation by instream sediments and uptake by plants and animals (Murphy and Meehan 1991). Based on dilution, there would be no effect to sturgeon habitat in the Kootenai River. Since these nutrients are in general short supply in the affected area and the potentially affected waters downstream, we predict that nutrient changes would have no effect on sturgeon.

The proposed project, together with related actions, reasonably foreseeable activities, and other projects spatially associated with the proposed project would result in an insignificant direct, indirect or cumulative effect to the sturgeon.

Statement of Findings

Based on the effects analysis above, all proposed activities would have **NO EFFECT** on the white sturgeon. The percent flow increase that would occur from this project is an insignificant portion of the total runoff for the Kootenai River. Similarly, any other effects would be diluted to the point of being immeasurable at the point of effect for white sturgeon.

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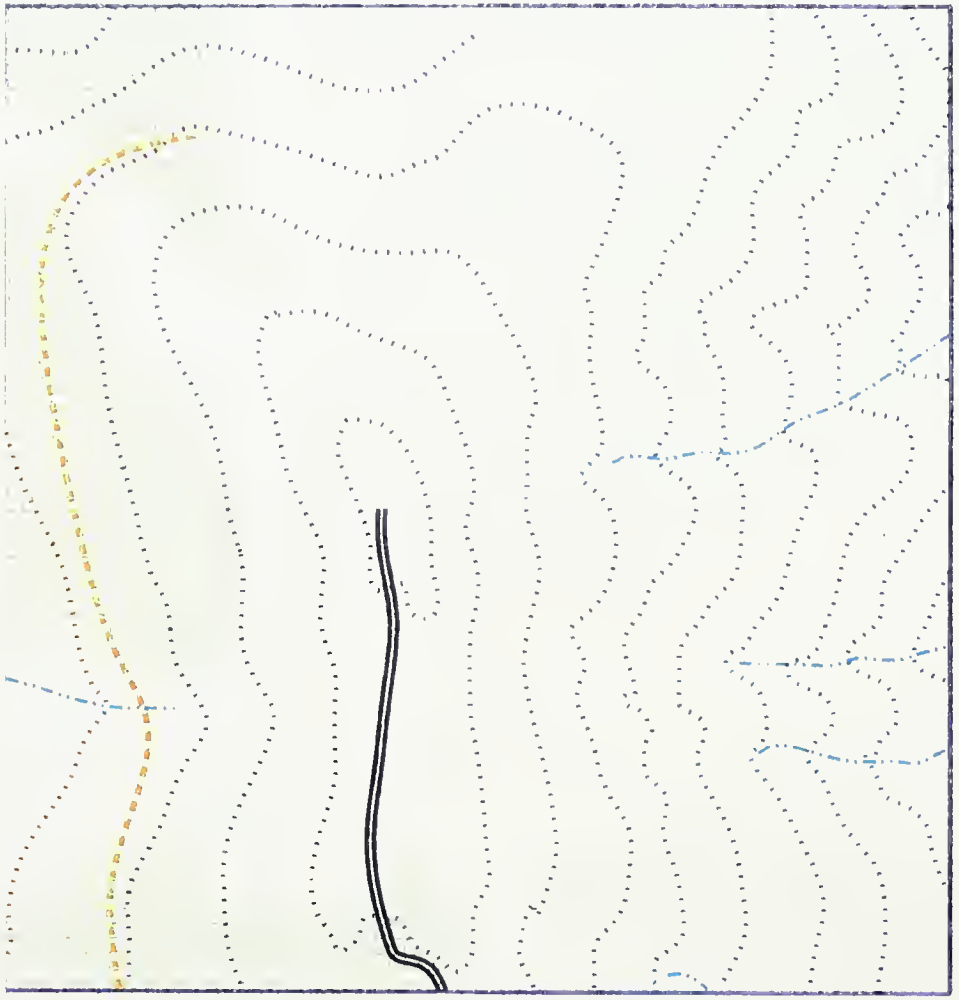
KEELER FISHERIES BIOLOGICAL
ASSESSMENT

FIGURE 1
PROJECT VICINITY

FIGURE 3
ALTERNATIVE 2

Proposed Keeler Mountain Timber Sale Map

Section 36, T30N, R34W



ALTERNATIVE 2

LEGEND

- STREAM
- EXISTING ROAD
- NEW ROAD
- CONTOUR LINE
- REGENERATION HARVEST
- NO HARVEST

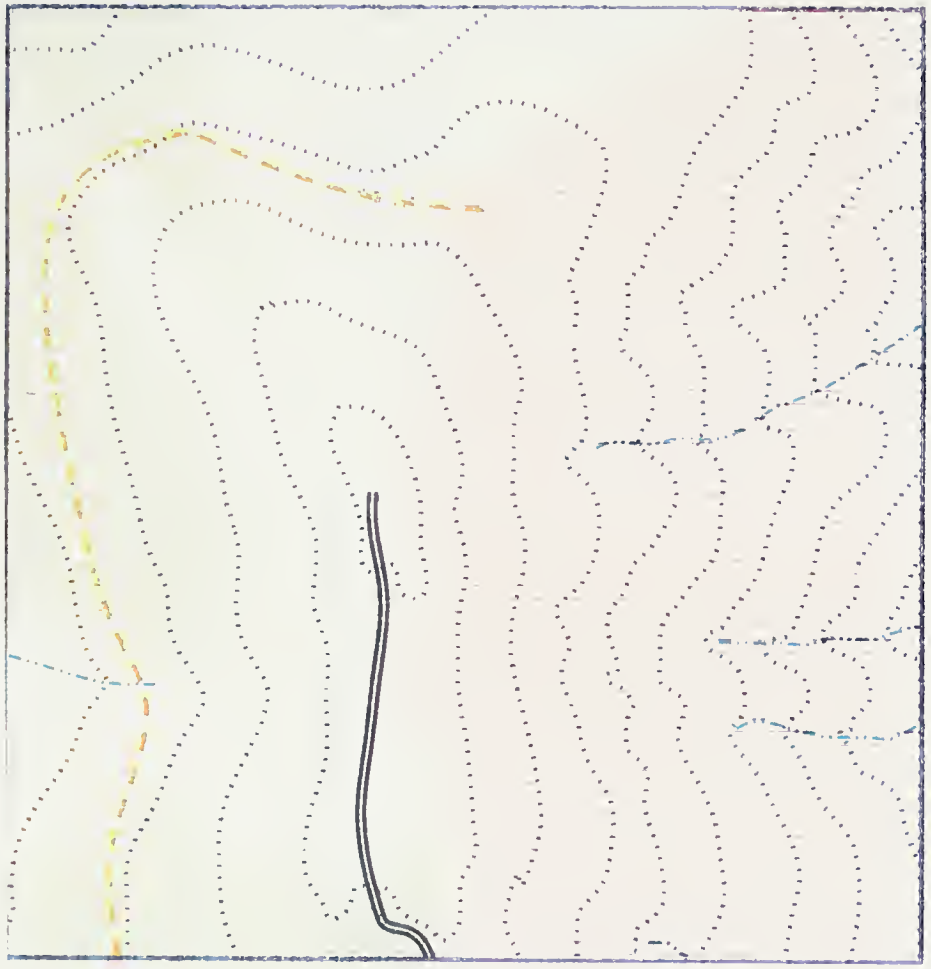
N

1/4 mile

FIGURE 4
ALTERNATIVE 3

Proposed Keeler Mountain Timber Sale Map

Section 36, T30N, R34W



ALTERNATIVE # 3

LEGEND

- STREAM
- CONTOUR LINE
- EXISTING ROAD
- NEW ROAD
- SALVAGE HARVEST
- REGENERATION HARVEST
- GROUP SELECTION HARVEST
- NO HARVEST

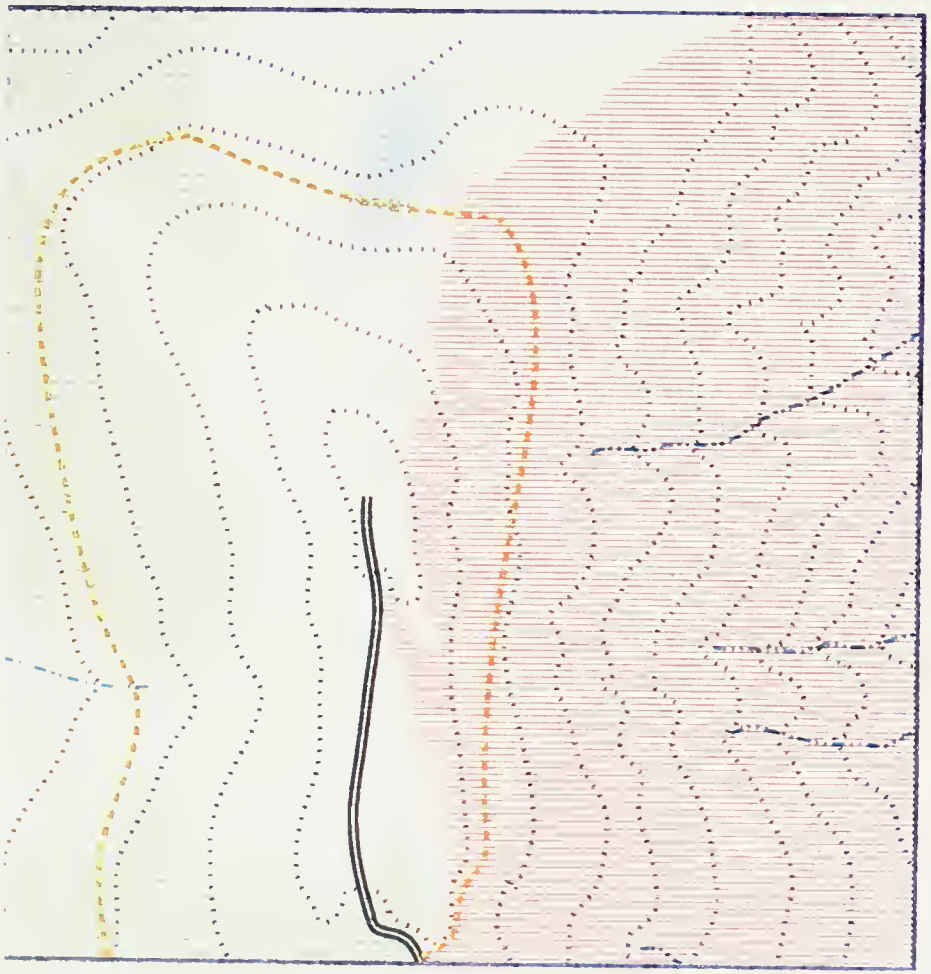
N

1/4 mile

FIGURE 5
ALTERNATIVE 4

Proposed Keeler Mountain Timber Sale Map

Section 36, T30N, R34W



ALTERNATIVE # 4

LEGEND

- STREAM
- CONTOUR LINE
- EXISTING ROAD
- NEW ROAD
- SALVAGE HARVEST
- REGENERATION HARVEST
- GROUP SELECTION HARVEST
- NO HARVEST

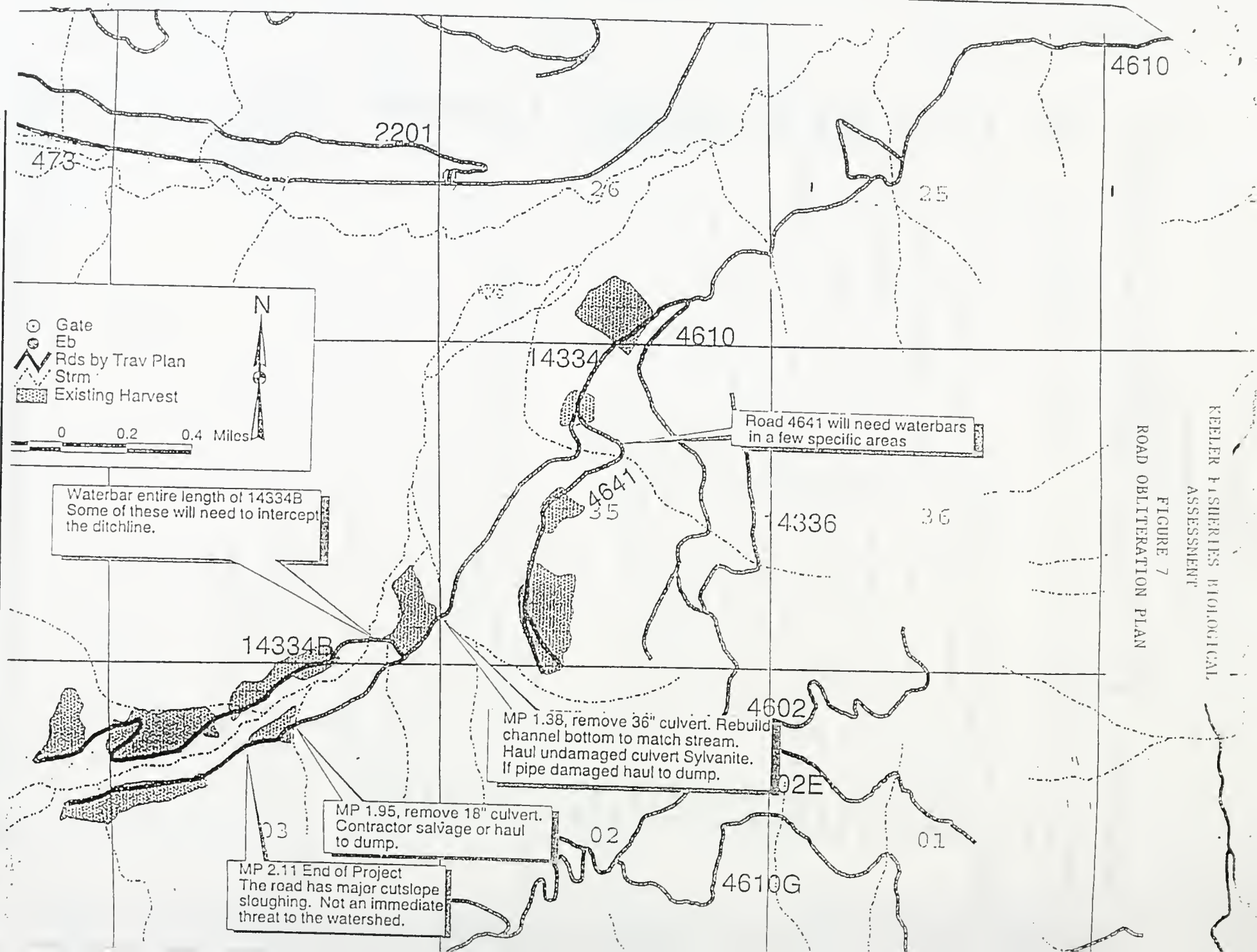
N

1/4 mile

FIGURE 6
LIST OF ROAD IMPROVEMENTS

KEELER MT. T.S. COST ESTIMATES 6-30-97
ALTERNATIVE 2 - F.S. RDS. INITIAL MAINTANCE AND RECONSTRUCTION

Segment 0+00 to 12+60:	
Rotary brush 200 + sawyer 150 + grapple skidder 130 =	480
Patrol	100
Segment 12+60 to 218+85:	
Rotary brush 3.9 mi at 350/mi	1,365
Sawyer, cut downed timber, mfg. sawlogs 3 days at 200/day	600
Excavator, clean cutbanks and minor repairs 10 hrs at 120/hr	1,200
Backhoe, clean catchbasins, minor repairs, dispose of slough material, 16 hrs at 65/hr	1,040
Dump truck, haul rock and slash, 10 hrs at 65/hr	650
Grapple skidder 4 hrs at 65/hr	260
36+65, repair slump in fill and bmps, need 2 ea gabions large rock and slash plug, est	700
59+15, repair washing under cmp	100
78+50, bmp'ize big slump, 10 ea w-beam guardrail 'flappers', 1 ea french drain, 500' slash filter,est	2,000
193+80, replace cmp, 40' at 20/ft	800
199+50, repair and armor catchbasin	1,000
218+85, improve radius of swb w/ endhaul fill	1,000
Repair/remove gates, road closures etc.	500
Dozer, dips	500
Patrol, 3.9 mi at 400/mi	1,560
Rd. # 4602 (Reconst and improve):	
Rotary brush 0.7 mi at 400/mi	280
Sawyer, cut/process timber for widening, 1 day	200
Excavator, widen curves/obtain fill material	1,000
Dozer, dips and widening	500
Dump truck, haul fill, 6 hrs at 65	390
Grapple skidder, 2 hrs at 65/hr	130
Drill/shoot rock	250
Patrol, 0.7 mi at 500/mi	350
Repair/remove gates, closures	500
Spray weeds, 4.3 mi at 200/mi	960
Seed disturbed areas, 3 ac at 120/ac	360
Subtotal F.S. existing roads	$18,775
Plus 7% mobilization	1,314
Total this segment	$20,089

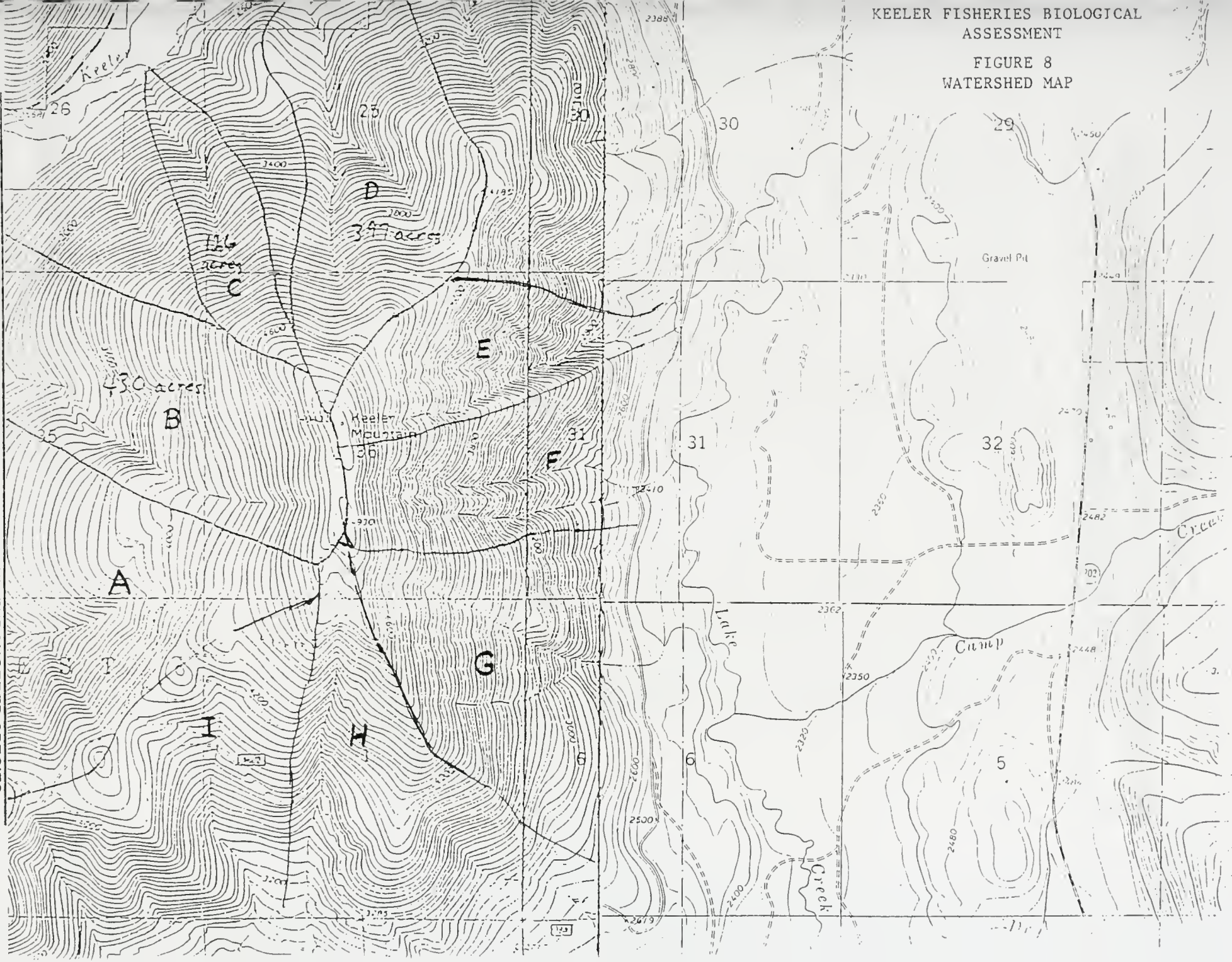


KEELER FISHERIES BIOLOGICAL ASSESSMENT

FIGURE 7
ROAD OBLITERATION PLAN

KEELER FISHERIES BIOLOGICAL ASSESSMENT

FIGURE 8
WATERSHED MAP



APPENDIX C
USFS CONNECTED ACTIONS FOR SPAR LAKE ANALYSIS AREA

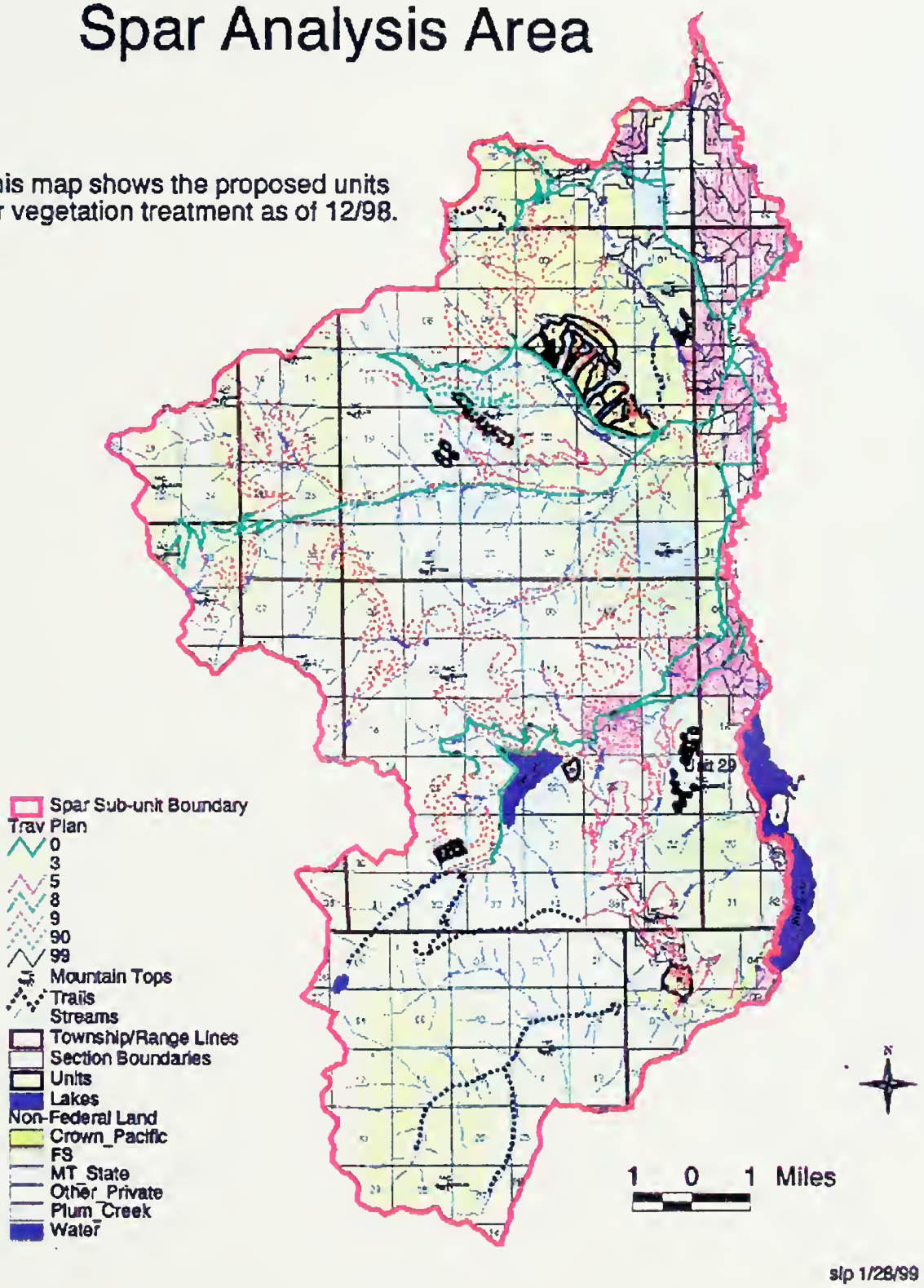
APPENDIX "C" PROPOSED TREATMENT AREAS FOR SPAR LAKE PLANNING UNIT

UNIT	ACRES	TREATMENT	%CROWN REMOVAL
1	51	Improvement cut	30-40%
2	103	Improvement cut	30-40%
3	16	Prep. Shelterwood	30-40%
4	14	Stand replacement	70-80%
5	36	Prep. Shelterwood	30-40%
6	43	Improvement cut	30-40%
7	79	Prep shelterwood	30-40%
8	65	Improvement cut	30-40%
9	64	Improvement cut	30-40%
10	54	Prep shelterwood	30-40%
11	62	Prep shelterwood	30-40%
12	141	Improvement cut	30-40%
13	135	Improvement cut	30-40%
14	19	Stand replacement	80%
15	6	Stand replacement	90%
16	15	Commercial thin	30-50%
17	26	Salvage	40-50%
18	8	Seed tree w/reserves	65-75%
19	16	Prep shelterwood	30-40%
20	25	Prep shelterwood	30-40%
21	32	Prep shelterwood	30-40%
22	12	Stand replacement	90%
23	7	Stand replacement	90%
24	20	Stand replacement	90%
25-28 Dropped			
29A-29N	77	Path clearcuts	95%
30	131	Improvement cut	30-40%

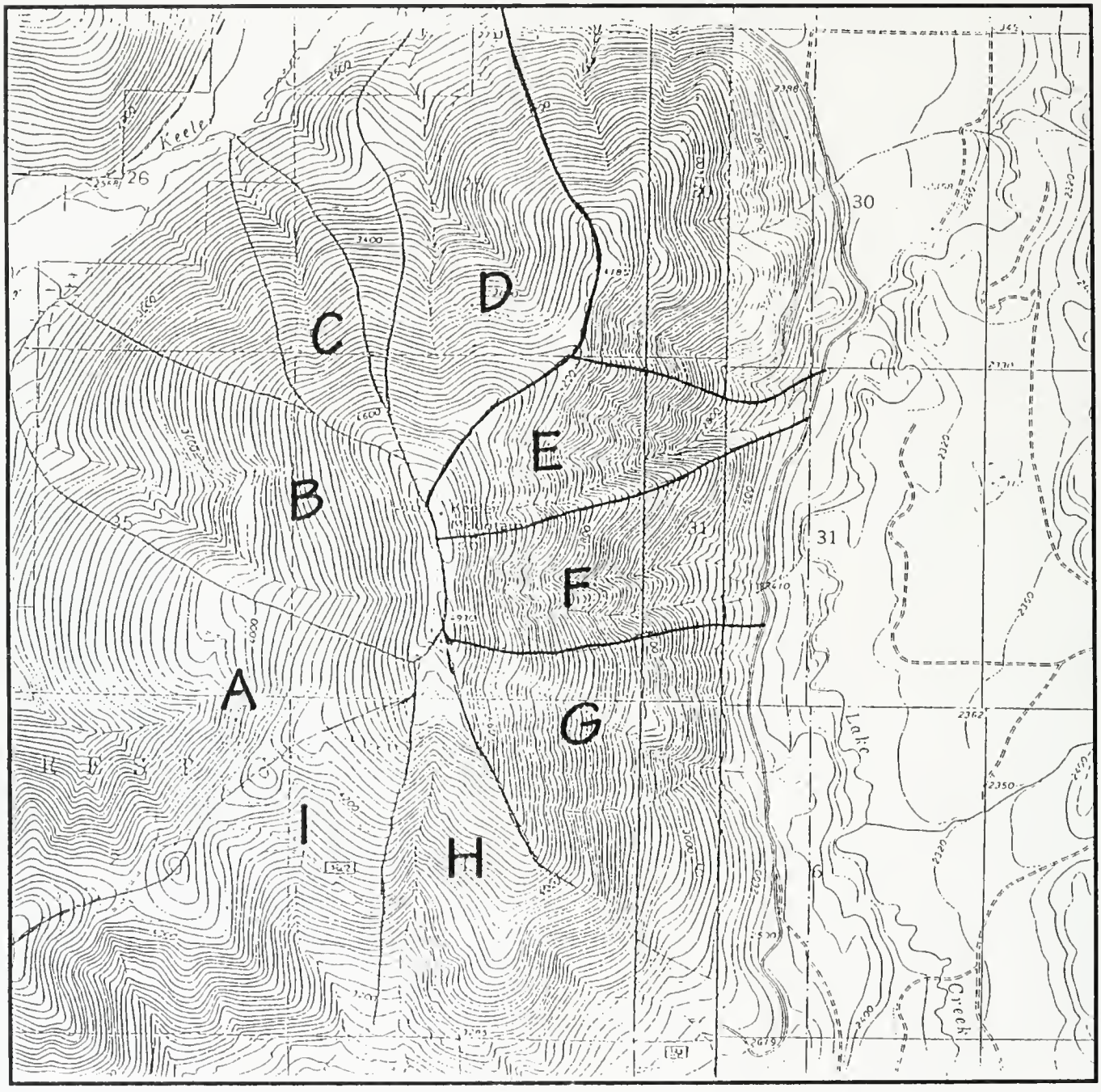
Remarks: Improvement cuts area generally a thin from below with some portion of overstory reduced, as well.
Prepatory shelterwood is similar to a commercial thin.
Stand Replacement is either a ST or CC w/reserves.

Spar Analysis Area

This map shows the proposed units for vegetation treatment as of 12/98.



APPENDIX D
WATERSHED MAP


A
B
C
D
E
F
G
H
I
Keele
26
30
31
35
Lake
Creek

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